

From Informal Coordination to Scope Commitments

Governing Decision-Making and Contractual
Transition in Bouwteam Projects

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by

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Preface

This thesis concludes the Master's programme in Construction Management and Engineering at Delft University of Technology. The research was conducted on behalf of Haskoning and in close collaboration with TU Delft. What initially began as a shared interest in project control and bouwteam collaboration gradually evolved into a more focused and specialised research topic: scope change governance within the bouwteam context.

At the outset of this project, my primary interest lay in project management and control. The contractual dimension of construction projects was not yet a central concern. However, as the research progressed, the legal and contractual environment proved to be inseparable from the way project teams organise their collaboration. Particularly within the informal and trust-based setting of a bouwteam, contractual arrangements influence how scope-related decisions emerge, are interpreted, and are later transferred into the realisation phase.

Engaging with contract law and governance theory shifted my understanding of control in projects. Rather than viewing informality as a deficiency, the research revealed how informal coordination can function as a strength—provided that critical decisions are articulated with sufficient clarity and traceability. This insight significantly shaped both the analytical direction of the thesis and my own professional perspective on project governance.

By applying a mixed-method research design, combining literature study, contract analysis, and Q-methodology, I was able to engage deeply with both theory and practice. The process provided not only academic insight but also practical understanding of the dynamics within bouwteam projects. I look forward to applying this knowledge in future professional practice.

Several individuals have contributed significantly to the completion of this research. I am grateful to Haskoning for providing the opportunity to conduct this study and for their continuous support. I would particularly like to thank Doutsen Swierstra, Linda Molenaar, and Jacob Bolle for their involvement in validating the Q-statements and facilitating access to project teams. Their efforts were crucial to securing the participation of fourteen respondents in the Q-study and subsequent interviews.

My sincere thanks also go to Franka Pieterse, my supervisor at Haskoning, for her guidance, critical feedback, and for facilitating valuable connections throughout the organisation. Finally, I would like to express my appreciation to Evelien Bruggeman, my first supervisor at TU Delft, and Leon Hombergen, Chair of the graduation committee, for their consistent support, constructive feedback, and strategic guidance throughout the research process.

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Luuk d'Ancona

Executive Summary

Context and problem definition

In Dutch bouwteam projects, scope-related decisions are predominantly developed during the collaborative design phase, where clients, contractors, and advisors jointly explore solutions under conditions of uncertainty. This setting enables flexibility, speed, and joint problem-solving, and is widely valued for its informal and relational character. At the same time, many decisions made in this phase gradually come to shape the contractual scope and form the basis for execution in the subsequent realisation phase, where a fundamentally different contractual regime applies.

In practice, the transition from the bouwteam phase to realisation—most commonly under UAV or UAV-GC—proves to be a structurally vulnerable moment. Decisions formed informally or incrementally are often incorporated into end-of-phase deliverables without clearly articulating their assumptions, mandate, or decision status. Once these decisions gain legal and financial significance, they may be reinterpreted, questioned, or reconstructed. This leads to delays, cost overruns, and scope disputes—not because the decisions were technically flawed, but because a sufficiently shared understanding of what was decided and with what level of commitment is lacking. Importantly, this interpretative fragility coexists with formal contractual liability structures, even when liability is not perceived as an immediate concern during the bouwteam phase.

These issues reflect a structural governance tension inherent to the bouwteam model: decisions are developed in an environment that values informality and shared problem-solving, yet they must ultimately function within a formal contractual regime that requires clarity and consistent application across roles and phases.

Research objective

The objective of this study is to examine how scope-related decision-making unfolds during the bouwteam phase, how such decisions gradually acquire commitment status, and how they are subsequently interpreted once a project enters the realisation phase under UAV or UAV-GC. The study seeks to explain why decisions that were broadly accepted during the bouwteam phase may later become sources of ambiguity or conflict, and how governance arrangements can better support the reliable transfer of such commitments across contractual phases.

Research approach

This study adopts a combined analytical approach to examine scope-related decision-making across the transition from the bouwteam phase to realisation. Three complementary perspectives are brought together to capture both the institutional setting and its practical interpretation.

First, a theoretical analysis is used to frame informal decision-making, relational governance, and contractual transition, with specific attention to how informal alignment may gradually become direction-setting without being explicitly recognised as such. Second, a contract analysis examines how the DG2020 bouwteam agreement and the execution regimes UAV 2012 and UAV-GC 2005 structure scope definition, decision authority, documentation, and liability at the point of transition. Third, a Q-method study, supplemented with validation interviews, is employed to capture how different professional roles interpret and evaluate scope-related decision-making practices in bouwteam projects.

These perspectives are analysed in parallel and subsequently synthesised to examine how scope-related decisions are formed, recognised, and relied upon under differing governance and contractual conditions. This synthesis forms the basis for the development of a governance framework that supports the recognition and proportional formalisation of commitments as they emerge.

Core findings: a structural tension around informality

The central finding of the study is the existence of a persistent tension in how informal decision-making is valued and assessed by different professional roles within bouwteam projects. Project managers

tend to value informality as a necessary mechanism for maintaining momentum, enabling adaptive problem-solving, and navigating uncertainty. From this perspective, flexibility and mutual trust are seen as prerequisites for project success.

In contrast, technical specialists and contract-focused professionals tend to interpret the same informal practices as sources of accumulated risk. They emphasise the absence of explicit commitment moments, incomplete documentation, and the limited clarity regarding what has formally been agreed, particularly once responsibility and liability shift in the realisation phase. Importantly, both perspectives are internally coherent and professionally rational. The tension does not stem from misunderstanding, but from structurally different evaluative positions within the same project environment.

The study demonstrates that this tension is not adequately addressed by existing bouwteam arrangements. Informality is implicitly encouraged, while mechanisms to determine when informal alignment becomes a commitment that others will rely upon remain underdeveloped.

Key aspects shaping this tension

The synthesis identifies four interrelated aspects that most clearly characterise how the tension between the value of informal coordination and the expectation of formal governance manifests in scope-related decision-making during the bouwteam phase.

- **Mandate clarity:** Although decision authority is formally defined, scope-related choices often crystallise around those most involved in the technical work. This supports collaboration, but blurs where and by whom commitments effectively emerge. At the transition to execution, this complicates reconstruction of how scope-defining choices took shape.
- **Systematic embedding of scope decisions:** Scope-related decisions may be recorded, but not always embedded consistently across the authoritative project documents. As a result, approved scope choices are not always clearly reflected in the documents that later function as contractual reference points.
- **Execution prior to approval:** In several cases, work proceeds on the basis of provisional or informally accepted decisions before formal confirmation has taken place. Although this practice is commonly justified by time pressure or perceived consensus, it increases vulnerability when subsequent clarification or revision is required.
- **Clarity of scope-related discussions:** Discussions concerning scope changes or design choices are not always explicitly framed as commitment moments. This limits shared understanding of what has been decided, what remains open, and which assumptions underpin the chosen direction.

In addition to these aspects, two broader patterns emerge across the empirical material. First, there is no consistently applied or structured sequence guiding how scope-related decisions evolve from exploration to commitment. Second, practitioners emphasise that improving decision robustness is less a matter of introducing new tools or software, and more a question of behavioural discipline of individuals.

These aspects are translated into a set of design principles aimed at strengthening scope-related decision-making without undermining the collaborative strengths of the bouwteam model. These principles focus on proportional formalisation: introducing additional structure only when informal alignment begins to shape downstream work or contractual reliance.

Governance framework

The study results in a governance framework that supports practitioners in navigating the identified tension between the value of informal coordination and the expectation of formal governance. The framework provides a structured way to distinguish between exploratory discussion and moments where informal alignment becomes a commitment that others will build upon, and to determine when formalisation is required.

By clearly marking when informal alignment turns into a commitment that others will rely on, the framework keeps informal collaboration intact while adding clarity at the point where decisions start to shape later phases. In this way, it provides a practical approach to handling—rather than trying to remove—the structural tension that characterises scope-related decision-making in bouwteam projects.

Managementsamenvatting

Context en probleemstelling

In Nederlandse bouwteam-projecten ontstaan scope-gerelateerde beslissingen voornamelijk tijdens de gezamenlijke ontwerpfase. Opdrachtgevers, opdrachtnemers en adviseurs verkennen onder onzekerheid samen oplossingen. Deze werkwijze stimuleert flexibiliteit, snelheid en gezamenlijk probleemoplossend vermogen en wordt gewaardeerd om haar informele karakter. Deze beslissingen groeien uit tot afspraken waar in de realisatiefase—onder een ander contractueel regime—op doorgewerkt moet worden.

De overgang van bouwteam naar realisatie—meestal onder UAV of UAV-GC—blijkt daarbij een kwetsbaar moment. Informeel of stapsgewijs gevormde beslissingen worden opgenomen in einddocumenten zonder dat aannames, bevoegdheden of status altijd expliciet zijn vastgelegd. Wanneer deze beslissingen na de transitie naar realisatie opnieuw worden geïnterpreteerd of ter discussie worden gesteld kan dit leiden tot vertragingen, kostenoverschrijdingen en scopegeschillen—niet zozeer omdat de inhoud onjuist was, maar omdat onduidelijk is wat precies is besloten en met welke status. Deze kwetsbaarheid bestaat naast formele aansprakelijkheidsregelingen, ook wanneer aansprakelijkheid tijdens de bouwteam-fase niet als direct risico wordt ervaren.

Hierin ligt een structurele governance-spanning besloten: scope-wijziging beslissingen ontstaan tijdens het bouwteam in een informele samenwerkingsomgeving, maar moeten tijdens uitvoering functioneren binnen een formeel contractueel kader.

Onderzoeksdoelstelling

Deze studie onderzoekt hoe scope-gerelateerde besluitvorming zich ontwikkelt tijdens de bouwteam-fase, hoe beslissingen uitgroeien tot richtinggevende afspraken waarop anderen voortbouwen, en hoe zij worden geïnterpreteerd wanneer het project de realisatiefase ingaat. De studie verklaart waarom breed gedragen beslissingen later toch tot onduidelijkheid of conflict kunnen leiden en hoe governance-afspraken de overdracht tussen contractuele fasen kunnen versterken.

Onderzoeksaanpak

De studie combineert drie methoden. Ten eerste biedt een theoretische analyse inzicht in informele en formele besluitvorming binnen samenwerkingsgerichte contractvormen. Ten tweede laat een contractanalyse zien hoe DG2020, UAV 2012 en UAV-GC 2005 besluitvorming, documentatie en aansprakelijkheid structureren. Ten derde brengt een Q-methodologisch onderzoek, aangevuld met validatie-interviews, in kaart hoe verschillende professionele rollen scope-gerelateerde besluitvorming waarderen en beoordelen.

De resultaten van deze drie methoden worden in samenhang geïnterpreteerd om te begrijpen hoe beslissingen ontstaan, hoe zij worden vastgelegd en hoe zij tijdens de uitvoering worden geïnterpreteerd en toegepast. Op basis hiervan zijn ontwerpprincipes geformuleerd en is een governance-framework ontwikkeld dat ondersteunt bij het tijdig en proportioneel formaliseren van richtinggevende afspraken.

Kernbevindingen: een structurele spanning rond informaliteit

De centrale bevinding van deze studie is dat binnen bouwteam-projecten een blijvende spanning bestaat in de manier waarop informele besluitvorming wordt gewaardeerd door verschillende professionele rollen.

Projectmanagers zien informaliteit vaak als een noodzakelijke voorwaarde om tempo te houden, flexibel in te spelen op onzekerheid en gezamenlijk tot oplossingen te komen. Vanuit dit perspectief zijn flexibiliteit en wederzijds vertrouwen essentieel voor een goed verloop van het project. Technische specialisten en contractmanagers kijken hier anders naar. Zij ervaren dezelfde informele werkwijze als nuttig, maar zien tegelijkertijd risico's ontstaan wanneer niet expliciet wordt vastgelegd wat is besloten, met welk mandaat en met welke status. Vooral bij de overgang naar de realisatiefase,

wanneer verantwoordelijkheden en aansprakelijkheden verschuiven, kunnen deze onduidelijkheden problematisch worden. Beide perspectieven zijn echter logisch en professioneel verdedigbaar. De spanning komt niet voort uit misverstanden, maar uit verschillende verantwoordelijkheden en belangen binnen dezelfde projectomgeving.

De studie laat zien dat deze spanning in de praktijk zelden expliciet wordt benoemd of bewust wordt gemanaged. Informaliteit wordt gestimuleerd en gewaardeerd, maar er bestaan geen duidelijke processen om vast te stellen wanneer informele afstemming uitgroeit tot een richtinggevende afspraak waarop in latere fasen moet kunnen worden vertrouwd.

Belangrijke aspecten die deze spanning vormgeven

De synthese brengt vier samenhangende aspecten in beeld die duidelijk maken hoe de spanning tussen de waarde van informele coördinatie en de verwachting van formele governance zichtbaar wordt in scope-gerelateerde besluitvorming tijdens de bouwteam-fase.

- **Duidelijkheid van mandaat:** Hoewel besluitbevoegdheid formeel is vastgelegd, ontstaan scope-gerelateerde keuzes in de praktijk vaak bij inhoudelijk betrokkenen. Dit bevordert samenwerking, maar maakt minder zichtbaar waar en door wie een richtinggevende afspraak ontstaat. Bij de overgang naar realisatie wordt daardoor minder duidelijk hoe scopebepalende keuzes precies tot stand zijn gekomen.
- **Systematische inbedding van scopebeslissingen:** Scope-gerelateerde beslissingen worden wel vastgelegd, maar niet altijd consequent verwerkt in de leidende projectdocumenten. Daardoor zijn goedgekeurde scopekeuzes later niet altijd duidelijk terug te vinden in de documenten die als contractuele referentie dienen.
- **Uitvoering vóór formele bevestiging:** In verschillende situaties wordt al gestart met werkzaamheden op basis van voorlopige of informeel geaccepteerde beslissingen, voordat formele bevestiging heeft plaatsgevonden. Hoewel dit vaak voortkomt uit tijdsdruk of een gevoel van consensus, vergroot het de kwetsbaarheid wanneer later aanpassing of verduidelijking nodig blijkt.
- **Explicitering van besluitmomenten:** Discussies over scopewijzigingen of ontwerpkeuzes worden niet altijd duidelijk gemarkeerd als momenten waarop een richtinggevende afspraak ontstaat. Daardoor is niet altijd helder wat definitief is besloten, wat nog openstaat en welke aannames de gekozen richting onderbouwen.

Naast deze vier aspecten komen twee bredere patronen naar voren. Ten eerste ontbreekt vaak een vaste of herkenbare volgorde waarin scope-gerelateerde beslissingen zich ontwikkelen van verkenning naar richtinggevende afspraak. Ten tweede geven professionals aan dat het versterken van besluitrobustheid minder vraagt om nieuwe tools of software, en meer om bewuste toepassing en gedragsdiscipline van de betrokkenen.

Deze inzichten zijn vertaald naar ontwerpprincipes die beogen scope-gerelateerde besluitvorming te versterken zonder de samenwerkingskracht van het bouwteammodel te beperken. Centraal staat het principe van proportionele formalisering: extra structuur wordt alleen toegevoegd op het moment dat informele afstemming gevolgen krijgt voor vervolgwerk of contractuele afhankelijkheid.

Governance-framework

Op basis van deze bevindingen is een governance-framework ontwikkeld dat helpt om onderscheid te maken tussen verkennende gesprekken en momenten waarop informele afstemming uitgroeit tot een richtinggevende afspraak waar op voortgebouwd wordt. Het framework ondersteunt bij het bepalen wanneer en in welke mate formalisering nodig is.

Door expliciet te markeren wanneer een afspraak richtinggevend wordt voor vervolgwerk, blijft de flexibiliteit van het bouwteam behouden, terwijl het risico op latere onduidelijkheid wordt verkleind. Het framework biedt daarmee een praktische manier om de structurele spanning die scope-gerelateerde besluitvorming in bouwteams kenmerkt doelgericht te hanteren, zonder te pretenderen deze volledig op te lossen.

Proportionate Formality Framework for Transferable Scope Decisions

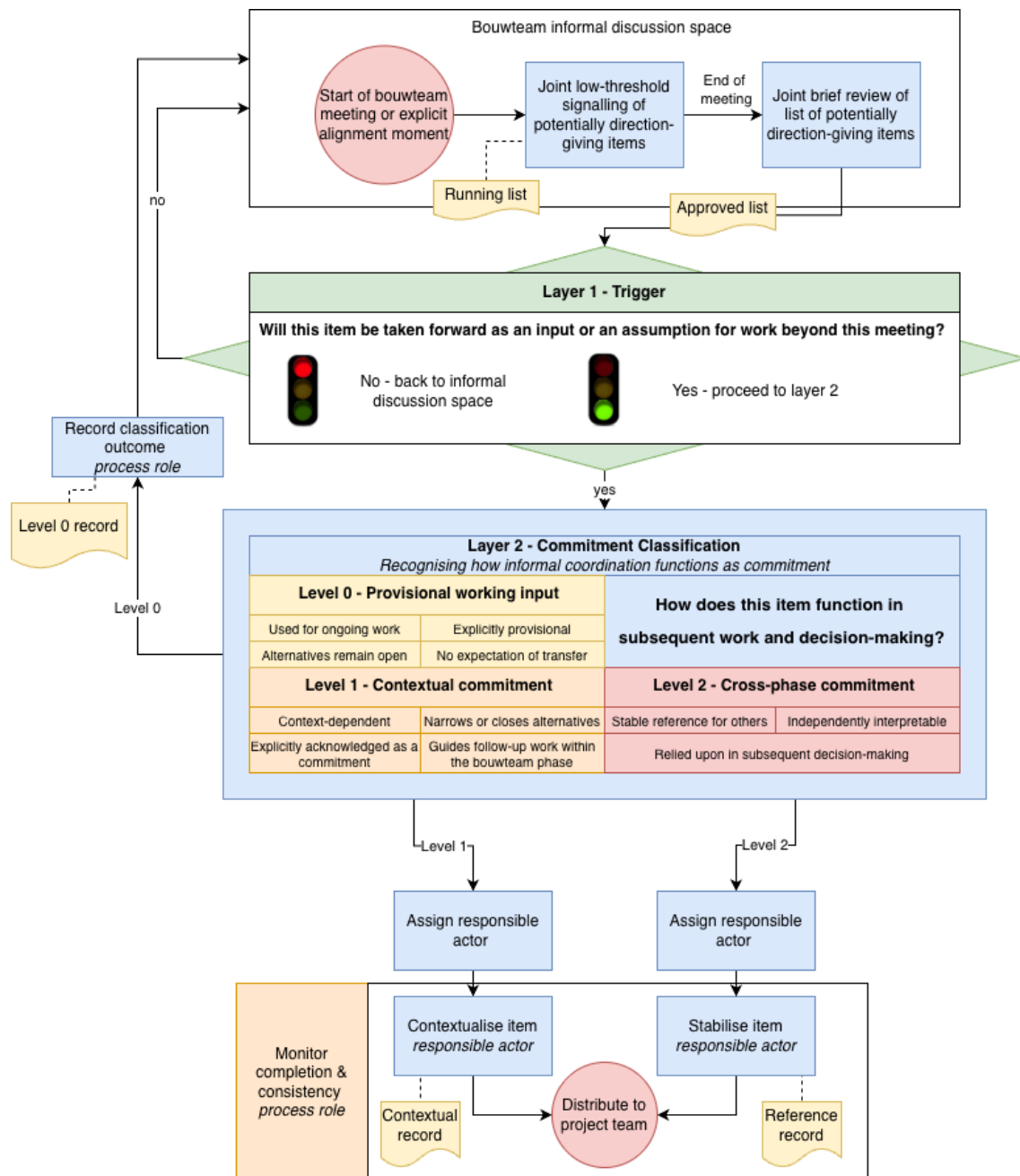


Figure 1: Governance framework for managing the transition from informal decision-making to transferable scope commitments in bouwteam projects.

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Nomenclature

Term	Definition
Bouwteam	Collaborative project phase in which client, contractor, and advisors jointly develop the design and scope prior to realisation.
DG2020	Dutch standard bouwteam agreement governing the collaborative design phase prior to contract execution.
Formalisation (governance-oriented)	The deliberate introduction of structure, explicitness, or documentation in decision-making processes to support clarity, coordination, and transferability, without necessarily creating legally binding commitments.
Informal decision-making	Decision-making based on dialogue, trust, and collaboration without immediate formal or contractual fixation.
Mandate clarity	The degree to which decision authority, responsibility, and contractual consequences are explicitly defined.
Realisation phase	Project phase in which works are executed under a formal contractual regime (UAV or UAV-GC).
Scalability	The capacity of the governance framework to be applied proportionally to projects of different size, complexity, and risk profile, without increasing procedural burden beyond what is functionally necessary.
Scope	The set of agreed deliverables, requirements, design choices, and constraints defining the project boundaries.
Scope-related decision	A decision that influences project scope, including design choices, requirements, risks, or deliverables.
Traceability	The extent to which scope-related commitments can be reconstructed and interpreted across project phases, enabling continuity of decision meaning without implying legal attribution of responsibility or liability.
Transferability	The ability of a decision made during the bouwteam phase to retain its meaning and intent in the realisation phase.
UAV	Uniforme Administratieve Voorwaarden for the execution of works under a traditional contracting model.
UAV-GC	Uniforme Administratieve Voorwaarden voor Geïntegreerde Contracten, assigning design and execution responsibility to the contractor.

Introduction

Collaborative procurement models, and in particular the *bouwteam*, have become increasingly prominent in Dutch infrastructure projects. Public and semi-public clients adopt bouwteams to improve design quality, reduce information asymmetry, and integrate contractor expertise at an early stage of the project lifecycle (de Koning, 2023). Within this model, scope, technical solutions, and risk considerations are deliberately developed in close interaction between client, contractor, and advisors, prior to the conclusion of a realisation contract.

This collaborative setting is characterised by iterative design development, multidisciplinary coordination, and continuous informal interaction. Rather than being taken as discrete, formally mandated acts, scope-related decisions typically evolve gradually through exploration, alignment, and provisional agreement. As alternatives are assessed and refined, decisions become embedded in drawings, meeting discussions, interim documents, and shared professional understanding. In practice, this enables flexibility and joint problem-solving under uncertainty.

At the same time, this mode of decision-making blurs the moment at which choices become binding. Decisions that are experienced as tentative during the bouwteam phase may later function as fixed points of departure for execution. As long as collaboration continues within the bouwteam, this ambiguity is rarely problematic. Its consequences become visible only when the project transitions to a different contractual and governance regime.

1.1. Problem Statement

Because scope-related decisions in bouwteams are formed through incremental and informal interaction, they are not always explicitly marked as final or authoritative at the time they are made. During the bouwteam phase, this mode of working supports flexibility and joint problem-solving. At the same time, it means that decisions regarding scope, interfaces, and responsibilities may remain implicit or dispersed across multiple documents, discussions, and interim design iterations.

When a project transitions into the realisation phase under a UAV or UAV-GC contract, this lack of explicit decision status becomes more consequential. Information and agreements developed during the bouwteam phase are then relied upon as a basis for execution, while responsibilities, mandates, and liability are contractually redistributed. At this stage, uncertainty may arise regarding which scope-related decisions can be treated as established, how they were documented, and how they should be interpreted within the framework of the execution contract.

As a result, managing scope across the transition from bouwteam to realisation presents a structural challenge in Dutch infrastructure projects. Although the underlying issue is not complex in substantive terms, it is strongly time-dependent and context-sensitive: the same decisions acquire a different status and meaning once the contractual setting changes. Figure 1.1 visualises this shift by illustrating how scope-related decisions formed during the bouwteam phase acquire contractual significance at the transition to the execution phase.

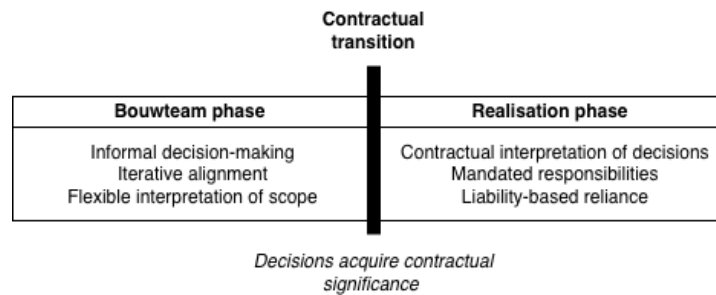


Figure 1.1: Change in interpretation and status of scope-related decisions across the transition from bouwteam to realisation

1.2. Exploratory Expert Interview

An exploratory interview with an experienced project control manager was conducted at an early stage of the research to support the delineation of the research problem and to assess its recognisability in Dutch bouwteam practice. The interview served to explore how scope-related decision-making is experienced by bouwteam practitioners.

The interviewee indicated that while the overall project scope in bouwteams is generally understood at a high level, decisions concerning sub-scopes, interfaces, and responsibilities often evolve gradually and remain open to interpretation. In his experience, such decisions are frequently embedded in ongoing discussions and design development rather than being explicitly identified as settled or final. As a result, responsibilities and cost ownership may remain ambiguous, particularly when decisions are revisited at a later stage of the project.

The interview further suggested that the presence of formal governance structures does not necessarily result in clear decision ownership. Even when decision-making forums are defined, mandates may remain implicit, causing decisions to circulate without a clearly identifiable moment at which responsibility is fixed. Documentation practices were described as fragmented, with scope-related decisions recorded across different documents, systems, or informal exchanges, complicating later reconstruction and verification.

Taken together, these observations illustrate how scope-related decisions formed through informal and iterative collaboration may remain insufficiently explicit to function as stable reference points later in the project.

1.3. Bouwteam and Contractual Context

The bouwteam is commonly positioned as an intermediate procurement arrangement situated between traditional design–bid–build contracts and fully integrated design–build models (Jansen et al., 1999). Within Dutch infrastructure projects, it is used to jointly develop the project definition, design outputs, planning, risk dossier, and cost development prior to the conclusion of a realisation contract. The legal basis of the bouwteam is generally an *overeenkomst van opdracht*, which provides flexibility and allows termination under Article 7:408 BW (Chao-Duivis, 2012).

Operationally, bouwteams rely on iterative coordination between client, contractor, and consultants. Meetings, workshops, and design sessions form the primary arena in which scope-related decisions emerge and are progressively shaped. These decisions influence the development of the *vraagspecificatie* or *bestek*, depending on whether the project transitions into a UAV or UAV-GC execution contract. As such, the bouwteam phase functions as a decision-forming environment in which scope-related agreements are developed prior to their contractual reliance during realisation.

Several model agreements structure bouwteam collaboration in Dutch practice. The VGB 1992 model provided early formalisation but offered limited guidance on documentation and accountability. More recent models, including DG2020 and KBNL 2021, introduce more explicit arrangements regarding roles, deliverables, decision-making procedures, and record-keeping. Among these, DG2020 has become the most widely applied framework in public and semi-public infrastructure projects and therefore serves as the primary contractual reference point in this thesis.

In infrastructure projects, the bouwteam phase typically feeds into a subsequent execution contract governed by either UAV or UAV-GC. While UAV is commonly applied when the design is largely completed prior to execution, UAV-GC is used when design responsibility is transferred to the contractor (Bruggeman et al., 2010).

1.4. Research Question and Sub-Questions

The preceding sections have established that scope-related decisions in bouwteam projects are typically formed through informal and iterative collaboration, and that their status and interpretation may change once projects transition into the realisation phase under a subsequent execution contract. While such decisions shape project deliverables and responsibilities, the processes through which they are identified as decisions, documented, and relied upon across phases remain insufficiently explicit in both practice and existing research.

Against this background, this thesis examines how scope-related decisions are formed during the bouwteam phase, how they are interpreted at the transition to the realisation phase, and how this process can be governed to support clarity, traceability, and transferability across contractual phases.

The main research question guiding this thesis is:

How do scope-related decisions take shape and acquire practical significance during the bouwteam phase, how does this influence their interpretation at the transition to the realisation phase under UAV(-GC), and how can this process be governed to improve clarity, traceability, and transferability?

This research question addresses the formation and interpretation of scope-related decisions in bouwteam projects. The following sub-questions operationalise the main research question by structuring its analysis into distinct analytical components.

Part 1 – Formation of Scope-Related Decisions in Bouwteams

- a) How are scope-related issues raised, discussed, and progressively framed as decisions during the bouwteam phase?
- b) How are scope-related decisions documented in practice, and how do project participants assess the adequacy of this documentation in terms of clarity and traceability?
- c) How do actor roles and procedural arrangements within bouwteam agreements (particularly DG2020) shape the formation, valuation, and recording of scope-related decisions?

Part 2 – Interpretation at the Transition to the Realisation Phase

- d) How are scope-related decisions from the bouwteam phase interpreted once the project transitions to the realisation phase under UAV or UAV-GC?
- e) How does the shift in contractual roles and liability affect how reliable bouwteam-era scope decisions are perceived to be?

Part 3 – Governing the Robustness of Scope-Related Decisions

- f) Which governance arrangements can support the robustness of scope-related decision-making in bouwteam projects, particularly in relation to traceability and transferability across project phases?

Together, these sub-questions structure the theoretical inquiry into collaborative decision-making and governance, the contractual analysis of phase transitions under DG2020, UAV, and UAV-GC, and the empirical exploration of practitioner perspectives through Q-methodology. By addressing the formation, interpretation, and governance of scope-related decisions in an integrated manner, the study provides the basis for developing and substantiating a governance framework that responds directly to the challenges identified across the bouwteam and realisation phases.

1.5. Scope and Boundaries

This study adopts a set of explicit analytical boundaries to examine scope-related decision-making in bouwteam projects in a focused and methodologically coherent manner. Table 1.1 summarises the principal delimitations of the research.

Table 1.1: Analytical scope and boundaries of the study

Boundary dimension	Included focus	Explicitly excluded
Conceptual	Scope-related decision-making processes, including how issues are initiated, interpreted, discussed, formalised, and transferred across phases	Substantive technical content of scope changes, except where actors explicitly treat it as scope-relevant
Process	Bouwteam phase and the transition into realisation, including decision-making and documentation practices	Construction-phase execution management not directly linked to bouwteam-era decisions
Contractual	DG2020 as primary bouwteam reference; UAV and UAV-GC for the realisation phase insofar as they affect interpretation and transfer of decisions	Detailed comparison of alternative bouwteam contracts beyond contextual reference
Stakeholders	Client, contractor, and technical advisors directly involved in the bouwteam	Subcontractors, end-users, political stakeholders, and third-party authorities, unless explicitly referenced by interviewees
Empirical	Professional perspectives captured through Q-methodology and follow-up interviews	Population-level generalisation of practices or behaviours
Geographical	Dutch civil engineering and infrastructure projects	International projects as empirical cases

An important clarification is that this study focuses on the *process* through which scope-related decisions emerge, rather than on the technical content of scope changes themselves. As reflected in the conceptual and process boundaries, the substantive technical characteristics of scope changes—both during the bouwteam phase and during construction—fall outside the scope of this research. Such content is only considered where project participants explicitly refer to it as part of their decision-making or documentation practices, for example in interview accounts.

1.6. Thesis Roadmap

This thesis is organised into ten chapters, each contributing a distinct step in the analysis of scope-related decision-making in bouwteam projects and its governance across project phases.

- **Chapter 1 – Introduction**
Introduces the research problem, positions the study within Dutch bouwteam practice, formulates the research questions, and defines the scope and boundaries of the research.
- **Chapter 2 – Research Context: The Bouwteam Model**
Describes the bouwteam as a collaborative procurement model in Dutch infrastructure projects, outlining its organisational characteristics and decision-making environment.
- **Chapter 3 – Theoretical Background**
Develops the theoretical foundations relevant to the study, including concepts related to scope definition, decision-making, documentation, governance, and information processing.
- **Chapter 4 – Methodology**
Presents the research design and methods, including Q-methodology, document analysis, and interviews, and explains how empirical data are collected and analysed.
- **Chapter 5 – Contractual Comparison**
Analyses DG2020, UAV 2012, and UAV–GC 2005 with regard to responsibilities, decision rights, documentation requirements, liability, and change mechanisms.
- **Chapter 6 – Professional Perspectives on Scope-Related Decision-Making**
Presents the results of the Q-method study, identifying distinct professional perspectives on scope-related decision-making, supplemented by insights from validation interviews.
- **Chapter 7 – Synthesis**
Integrates theoretical insights, contractual analysis, and empirical findings to explain how scope-related decisions are formed, documented, and interpreted across project phases, and to identify structural governance challenges.
- **Chapter 8 – Proportionate Formality: A Governance Framework**
Presents the final governance framework developed in this study, aimed at improving the clarity, traceability, and transferability of scope-related decisions in bouwteam projects.
- **Chapter 9 – Discussion**
Positions the findings conceptually, reflects on their theoretical and contractual implications, and clarifies the scope, limitations, and contribution of the proposed governance framework.
- **Chapter 10 – Conclusion and Recommendations**
Answers the main research question, reflects on the implications of the findings, and provides recommendations for practice and directions for future research.

Footnotes beginning with “Statement X” indicate source material from the chapters on the bouwteam model, theoretical background, and contractual context that was used—in an interpretative manner—to inform the development of Q-method statements related to scope-related decision-making in bouwteam projects. The resulting set of statements underpins the Q-method analysis presented in Chapter 6 and is provided in full in Appendix C.

Research Context: The Bouwteam Model

Bouwteams are increasingly used in Dutch infrastructure and construction projects as a precontractual collaboration model in which client and contractor jointly develop design information, scope definition, risk insights, and cost structures prior to the conclusion of an execution contract. The bouwteam does not predetermine which contractual form will govern the realisation phase. Depending on project objectives, risk allocation strategies, and procurement context, projects may transition into a UAV contract, a UAV-GC contract, or another execution arrangement.

For the study of scope change governance, the bouwteam phase is relevant because it constitutes the environment in which scope definitions are iteratively shaped, discussed, and recorded before formal contractual commitments apply. Decisions made during the bouwteam phase function as inputs for a subsequent contract that operates under fundamentally different governance logics. UAV and UAV-GC, for example, differ sharply in their treatment of authority, documentation, information hierarchy, and liability. These differences affect how bouwteam-made decisions are interpreted once the execution phase begins.

This chapter positions the bouwteam as a conceptual and procedural context preceding the contract analysis in Chapter 5. Its purpose is to delineate the characteristics of the bouwteam and clarify how it differs from two-phase contracting. The chapter does not engage in legal interpretation of individual contractual clauses. The bouwteam is therefore treated not as a theoretical framework, but as an empirically embedded governance configuration whose characteristics condition the application of theory in later chapters.

2.1. Conceptual Characteristics of the Bouwteam

The bouwteam is commonly characterised as a collaborative phase in which client and contractor jointly prepare the project definition for execution. A foundational academic treatment is provided by Chao-Duivis (2012), who describes the bouwteam as a form of early contractor involvement governed by a contract for services (*overeenkomst van opdracht*). This legal structure allows flexibility in collaboration and termination—both parties may withdraw under Article 7:408 BW—while enabling the joint development of deliverables that inform a later execution contract.

Within this arrangement, the bouwteam is defined by two core features. First, collaboration is directed at improving the quality and completeness of project information before binding contractual commitments are fixed. Second, decision-making during the bouwteam phase is advisory in nature: agreements reached during collaboration do not in themselves acquire contractual force and only become binding once explicitly incorporated into a subsequent execution contract.

In professional and academic literature, the bouwteam is often positioned between traditional and integrated contracting models. Jansen et al. (1999) frames the bouwteam as a two-phase procurement logic in which information and scope are stabilised prior to execution. More recent studies, such as Correa Galdeano (2022), point to persistent ambiguities in risk ownership and documentation practices

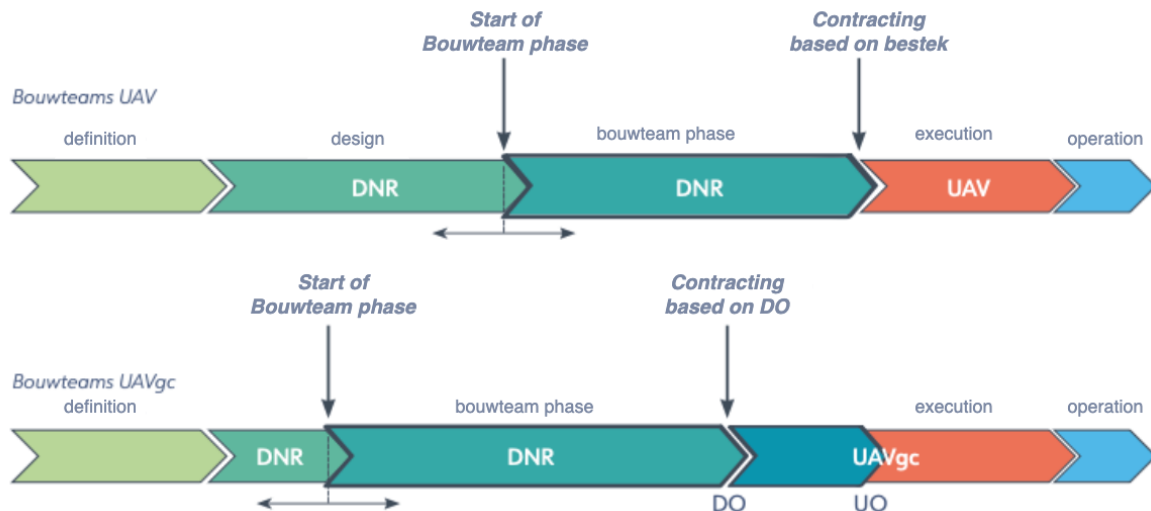


Figure 2.1: Typical structure of a bouwteam process, showing entry points, development stages, and the transition to execution. Adapted from Bouwend Nederland, *Handreiking Bouwteams*.

within bouwteams, underscoring the importance of how information and decisions are transferred to the execution phase.

Across these sources, several recurring characteristics of the bouwteam can be identified:

- **Joint development of deliverables:** client and contractor collaboratively develop design information, cost estimates, planning, and risk assessments.
- **Iterative and multidisciplinary interaction:** decisions typically emerge through discussion and gradual convergence rather than through formalised procedures.
- **Advisory decision-making:** agreements reached during the bouwteam phase do not have contractual force until explicitly incorporated into the execution contract.
- **Emphasis on information quality:** the primary objective of the bouwteam is to reduce uncertainty prior to the allocation of legally enforceable obligations.

These characteristics define the bouwteam as a precontractual decision-making environment in which scope-related information is developed without yet being contractually fixed.

2.2. The Bouwteam Process

Although bouwteam arrangements vary across projects, they generally follow a recognisable process structure. Collaboration typically begins at a selected level of design maturity (e.g. VO, DO, or earlier) and continues until the project definition is considered sufficiently developed for contracting. The practical phases of this process are illustrated in Figure 2.1, adapted from the Bouwend Nederland Handreiking Bouwteams.

Three conceptual features of this process are particularly relevant for the present study:

1. **Variable starting points.** A bouwteam may commence before any formal design exists or after the client has prepared an initial concept or VO. The degree of design maturity at entry influences how scope-related decisions emerge during collaboration.
2. **Iterative convergence toward a project definition.** During the bouwteam phase, deliverables such as design documents, cost updates, planning outputs, and a risk dossier are progressively developed. These outputs form the basis for the execution contract but do not yet carry contractual force.
3. **A transition moment requiring formalisation.** At the conclusion of the bouwteam phase,

parties negotiate and conclude an execution contract (UAV, UAV-GC, or otherwise). At this point, previously advisory agreements must be translated into binding obligations, and scope-related decisions must be explicitly articulated.

Because much of the decision-making during the bouwteam phase is iterative and often informal, this transition moment is inherently sensitive. Ambiguities in scope definition, risk interpretation, or documentation may persist if not explicitly addressed prior to contracting (Chao-Duivis, 2012).¹

2.3. Bouwteam versus Two-Phase Contracting

In Dutch practice, bouwteams are sometimes described as a form of two-phase contracting. While similarities exist at a procedural level, equating the two obscures important conceptual and contractual differences. These differences are summarised in Table 2.1.

Table 2.1: Conceptual differences between a standalone bouwteam and two-phase contracting

	Standalone bouwteam (Chao-Duivis, 2012)	Two-phase contract (CROW, 2023)
Contractual position	Independent agreement	Design phase is Phase 1 of an integrated overarching contract
Exit options	Parties may terminate without obligation to proceed to execution	Termination triggers contractual consequences; disengagement is not voluntary
Status of decisions	Decisions are advisory until explicitly incorporated into a subsequent contract	Decisions from Phase 1 form part of the contractual framework unless explicitly excluded
Right to execution phase	No entitlement to execution phase	Client termination after Phase 1 is contractually constrained
Legal force of deliverables	Deliverables acquire legal force only through explicit annexation	Deliverables are automatically embedded unless otherwise specified

These distinctions affect how the boundary between exploratory collaboration and contractual commitment is drawn. In two-phase contracts, this boundary is partially internalised within a single contractual framework. In standalone bouwteams, by contrast, the separation between advisory collaboration and binding commitment remains structurally explicit.

Because the empirical projects examined in this thesis employ standalone bouwteams rather than embedded two-phase contractual models, two-phase contracting is not analysed further. The comparison is included solely to delineate the conceptual scope of the research.

¹Statement 19: The length of the bouwteam period made it difficult to balance formal documentation with informal discussions about scope changes.

Theoretical Background

This chapter develops the theoretical framework used to analyse scope-related decision-making in bouwteam projects. Rather than proposing normative models or best practices, it provides analytical concepts to explain how scope-related issues emerge, are interpreted, documented, and transferred across project phases.

The chapter is structured as follows. Section 3.1 clarifies the concepts of scope and scope change as a basis for analytical consistency. Sections 3.2 to 3.4 examine why scope-related decisions are inherently fragile, focusing on informal coordination, traceability, role-based interpretation mechanisms, and authority structures. Section 3.5 analyses the interface between the bouwteam phase and contractual execution, where the meaning of earlier decisions is reinterpreted under a different governance regime. Section 3.6 discusses governance instruments intended to stabilise and transfer scope-related decisions once they acquire lasting significance.

Together, these sections establish the conceptual lens through which the empirical findings are analysed in the subsequent chapters.

3.1. Scope and Scope Change

In order to analyse scope-related decision-making in bouwteam projects, it is first necessary to clarify what is meant by scope and scope change. These concepts are widely used in project management literature, yet their precise meaning is not always applied consistently in practice. This section therefore establishes a clear conceptual foundation by defining scope in terms of deliverables and by distinguishing scope changes from other forms of project change.

3.1.1. Scope, Deliverables, and Project Scope

Project management standards consistently define scope as the set of deliverables that a project is intended to produce. The PMBOK Guide, PRINCE2, the APM Body of Knowledge, and ISO 21502 all describe scope in terms of specified outputs that together realise the project's objectives (APM, 2014; AXELOS Limited, 2017; ISO, 2021; PMI, 2021). Within this literature, a common distinction is made between scope and project scope. Scope refers to the content and definition of the deliverables themselves, whereas project scope refers to the work required to produce those deliverables.

Kerzner (2009) emphasises the analytical importance of this distinction, arguing that changes to deliverables and changes to the work required to realise them follow fundamentally different managerial logics.² The distinction is reflected in parallel decomposition structures, such as product breakdown structures, which organise deliverables, and work breakdown structures, which organise tasks and activities. From an analytical perspective, separating scope from project scope clarifies whether an emerging issue concerns what the project is expected to deliver or merely how those deliveries are achieved. Defining scope as a bounded set of deliverables therefore provides a clear basis for analysing how scope-related issues are identified and addressed in subsequent sections.

²Statement 10: The project team generally reached consensus about what fell inside or outside the agreed scope.

3.1.2. What Constitutes a Scope Change

Building on this definition, project management literature typically defines a scope change as any modification to the agreed set of deliverables. This includes the addition of new deliverables, the removal of existing ones, or substantive changes to their required characteristics or performance. Ibbs et al. (2007) explicitly distinguish scope changes from other categories of project change, such as schedule adjustments or site-related variations, by emphasising that scope changes alter what the project must ultimately deliver.

Standards such as the PMBOK Guide, PRINCE2, and ISO 21502 adopt a similar position, noting that scope changes may relate to functional requirements, performance attributes, or product characteristics, but remain conceptually distinct from routine design development within an agreed scope (AXELOS Limited, 2017; ISO, 2021; PMI, 2021). Design development typically concerns the progressive elaboration of solutions that are already implied by the agreed deliverables, whereas scope change implies a modification of those deliverables themselves.

This distinction is analytically important for the present study. Treating scope change as a change in deliverables rather than as a general category of project adjustment provides a clear criterion for identifying which decisions are scope-related and which are not. It also allows subsequent sections to focus specifically on decisions that have implications for the definition, documentation, and later interpretation of project scope, rather than on technical refinements that occur within established boundaries.

3.2. Informality and Formal Anchoring

Scope-related decisions in bouwteam projects do not emerge in a purely formal setting. Instead, they are shaped within a collaborative environment characterised by close interaction, distributed expertise, and ongoing design development. While formal procedures and documentation requirements exist, much of the coordination that precedes scope-related decisions takes place informally. This section examines the theoretical tension between informal coordination and formal anchoring, focusing first on why informality is functional in collaborative and uncertain contexts, and then on when and why it becomes risky from a governance perspective.

3.2.1. Why Informal Coordination is Functional

Project environments characterised by high uncertainty and interdependence place substantial demands on coordination and information processing. Galbraith (1974) conceptualises organisations as information-processing systems and argues that, as uncertainty increases, organisations must either reduce the need for information processing or expand their capacity to process information. In integrated design settings such as bouwteams, tasks are inherently interdependent and evolve in parallel, making it difficult to predefine interfaces or fully specify decision paths in advance. Under such conditions, formal hierarchical channels and predefined procedures are often insufficient to handle the volume, ambiguity, and pace of emerging information.

In response to these constraints, informal coordination and lateral interaction function as adaptive mechanisms for managing complexity. Informal discussions allow project participants to exchange tacit knowledge, clarify ambiguities in real time, and explore solution spaces without the procedural rigidity associated with formal decision-making (Galbraith, 1974). Rather than bypassing governance, such interaction expands the organisation's effective information-processing capacity by enabling rapid alignment across disciplinary boundaries.

This functional role of informality can be understood through the lens of relational governance. Macneil (1980) characterises relational governance as coordination based on flexibility, mutual adjustment, and shared expectations, rather than on fully specified and enforceable obligations. Bouwteams operate predominantly within this relational governance logic during early design development, where decisions emerge through interaction and are sustained by trust and professional norms rather than by contractual enforcement.

The reliance on informal coordination is further reinforced by limitations of bureaucratic control under uncertainty. Ouchi (1979) argues that when tasks are difficult to specify and outcomes are hard to measure, behaviour-based and outcome-based control mechanisms lose effectiveness. Organisations

then increasingly depend on relational or “clan” forms of control, in which shared values and professional judgement guide action. In bouwteams, such relational control supports joint problem-solving, iterative refinement, and mutual adjustment across organisational roles.

Empirical studies of collaborative project arrangements show that informal interaction can enhance perceived efficiency and cooperation by fostering openness and trust between client and contractor (Larson, 1995).³ Informality is therefore not a deviation from effective governance, but a functional response to uncertainty, interdependence, and incomplete specification. At the same time, the functional value of informality depends on how it is governed. When coordination and decision-making rely predominantly on informal interaction without being anchored in agreed procedures or records, transparency decreases and shared understanding becomes harder to sustain.

3.2.2. When Informality Becomes Risky and Requires Formal Anchoring

While informal coordination supports flexibility and learning, it also introduces governance risks when decisions acquire lasting significance. One such risk concerns the tendency of organisations to avoid explicit articulation of uncertainty or disagreement. Argyris (1977) shows that organisations often develop defensive routines that discourage individuals from documenting errors, unresolved issues, or contested assumptions. These routines can reinforce informality by keeping sensitive discussions off the formal record, even when decisions begin to shape the project’s scope.

A related risk arises from the decoupling of formal structures from actual practice. Meyer and Rowan (1977) argue that organisations frequently maintain formal procedures and documentation systems to signal rationality and compliance, while everyday behaviour diverges from these structures. In collaborative project settings, this can result in a situation where formal scope-change procedures exist on paper, but decisions are effectively formed through informal interaction without being explicitly anchored in the prescribed governance framework.

Such decoupling becomes problematic when decisions made in an informal, relational context later need to be interpreted or enforced in a more formal setting. Poppo and Zenger (2002) note that relational and formal governance mechanisms coexist but serve different functions: relational mechanisms support adaptation and cooperation, whereas formal mechanisms structure monitoring, accountability, and enforcement. When decisions are not deliberately translated from relational interaction into formal records, their meaning may become ambiguous once formal governance gains prominence.

From a governance perspective, formal anchoring does not function as a replacement for informal coordination, but as a complementary mechanism that stabilises decisions once they move beyond exploratory interaction. Turner and Keegan (2001) calls this a governance-for-delivery orientation, emphasizing the importance of formalisation to ensure transferability across phases. While informal coordination enables learning and adaptation, formal anchoring provides a means to fix meaning, responsibility, and reference points when decisions begin to carry lasting implications. The tension between these two logics is therefore structural rather than accidental.

3.3. Scope Change as a Process and its Traceability Requirements

While scope-related issues in bouwteams may emerge through informal interaction, project management literature consistently conceptualises scope change as a process through which emerging issues are translated into explicit decisions about project deliverables. This section introduces scope change as a recognisable process logic across standards and positions traceability as a necessary condition for decision stability and later interpretation. The focus is not on prescribing how decisions should unfold in practice, but on establishing an analytical reference frame for examining how scope-related issues move from initial signal to formalised decision.

3.3.1. Generic Process Logics Across Standards

Literature consistently characterises scope change as a staged process through which potential modifications to project deliverables are identified, assessed, decided upon, and incorporated into the project baseline. Although terminology and emphasis vary, project management standards such as PRINCE2, ISO 21502, the PMBOK Guide, and the APM Body of Knowledge describe comparable sequences that

³Statement 38: Overly formal procedures for transferring bouwteam agreements to realization can damage trust and openness.

move from recognising an emerging issue to evaluating its implications, formal decision-making, and implementation (APM, 2014; AXELOS Limited, 2017; ISO, 2021; PMI, 2021).

Table 3.1 synthesises these formulations as presented by Sharma et al. (2017) and highlights a shared functional pattern consisting of initiation, evaluation, assessment, decision, and implementation. Rather than prescribing procedural detail, this pattern provides a common analytical structure for distinguishing emerging issues from authorised scope changes and for identifying when a potential modification acquires decision status.

Table 3.1: Change-control process keywords across standards (after Sharma et al., 2017). Editions as compared in Sharma: PMBOK 4th, ISO 21500:2012, PRINCE2 5th, APM BoK 6th.

PMBOK	ISO 21500 ^a	PRINCE2	APM BoK
1. Tracking	1. Record change request	1. Capture	1. Request
2. Reviewing ^b	2. Evaluate	2. Examine	2. Review
3. Regulate process to meet PMP objectives	3. Assess the impact	3. Propose	3. Assessment ^c
	4. Approval ^d	4. Decide	4. Decision
	5. Implementation	5. Implement ^e	5. Implementation

^a Statement 11: Scope changes followed a structured sequence—initiation, evaluation, assessment, decision, and implementation.

^b Statement 14: Change proposals were reviewed early to avoid uncontrolled development and duplicate assessment work.

^c Statement 15: Assessments of scope changes resulted in clear, updated documents such as revised risk registers or cost estimates.

^d Statement 16: Approval and escalation outcomes regarding scope changes were clearly recorded before implementation.

^e Statement 17: Every approved scope change was systematically implemented into the relevant bouwteam documents.

Across these frameworks, the literature stresses several conceptual elements rather than the precise sequencing of steps. First, scope change typically begins when project participants identify emerging constraints, errors, or coordination issues as project information develops (Hwang & Low, 2012; Love et al., 2011).⁴ Second, meaningful evaluation requires clarification of whether an observed issue constitutes a genuine modification to deliverables or merely routine design development within the existing scope. Third, approval and implementation depend on clear documentation and shared understanding, as incomplete or ambiguous records are repeatedly identified as sources of misalignment and dispute (Ibbs et al., 2007).

In collaborative arrangements such as bouwteams, these process logics are rarely enacted as rigid, linear sequences. Issues may surface through multidisciplinary interaction, be explored iteratively, and only later be formalised into traceable decisions. The literature therefore conceptualises scope change not as a fixed procedure, but as a structured pattern through which evolving information is progressively translated into decisions that affect the project's deliverables.

3.3.2. Traceability as a Condition for Decision Stability

Beyond the existence of a generic process logic, literature on change control consistently emphasises traceability as a prerequisite for decision stability. Traceability refers to the ability to identify, follow, and verify modifications to project deliverables over time, including their origin, rationale, approval, and incorporation into project documentation. Project management standards stress that clear and consistent records of proposed and approved changes are essential for maintaining coherence in the evolving definition of scope (ISO, 2021; PMI, 2021).

Empirical studies reinforce this emphasis by showing that contemporaneous documentation supports predictable project performance and reduces ambiguity, whereas gaps or inconsistencies in records are recurrent precursors of disputes and misalignment (Ibbs et al., 2007; Love et al., 2011). From this perspective, traceability functions as a stabilising mechanism: it enables scope-related decisions to be identified as such, distinguished from preliminary discussion, and relied upon beyond the moment at

⁴Statement 13: It was often unclear who raised a change, when, and why.

which they were made.⁵⁶⁷

Importantly, traceability does not concern documentation in isolation, but the relationship between decision-making processes and recordability. Even where scope change processes are navigated informally through discussion and iterative coordination, the stability of resulting decisions depends on whether they are anchored in records that make their status, content, and implications explicit. Where such anchoring is incomplete or ambiguous, decisions may remain open to interpretation, reinterpretation, or contestation beyond the moment at which they were made.⁸

Traceability thus forms a critical link between the process by which scope-related issues are addressed and the extent to which resulting decisions acquire durable meaning across time, organisational roles, and project phases. It provides the analytical basis for examining how governance instruments attempt to stabilise, transfer, and enforce scope-related decisions once they move beyond their original collaborative context.

3.4. Role-Based Interpretation Mechanisms

When traceability is imperfect, scope-related decisions are particularly vulnerable to divergent interpretation. Even when actors participate in the same discussions and work with the same information, they may attach different meanings to emerging issues, proposed changes, and recorded outcomes. This section examines theoretical mechanisms that explain why such divergent interpretations arise, focusing on information asymmetry, behavioural mechanisms under uncertainty, organisational role expectations, and the distribution of decision rights. Together, these mechanisms clarify why scope-related decisions may be perceived, documented, and later interpreted differently across roles in bouwteam projects.

3.4.1. Information Asymmetry and Role-Differentiated Knowledge

Scope-related decisions in bouwteam projects are shaped by the uneven distribution of information across organisational roles. In project-based organisations, knowledge is inherently specialised: technical, contractual, financial, and managerial expertise is distributed across disciplines rather than concentrated in a single decision-making centre. As a result, participants involved in scope-related discussions operate with different information sets, which affects how emerging issues are interpreted and evaluated.

Galbraith (1974) argues that such information asymmetry is a structural consequence of task differentiation and interdependence within organisations. In integrated project settings, information relevant to scope-related decisions is embedded in specialised practices and professional domains, meaning that no single actor has a complete overview of all implications. This structural distribution of information implies that scope-related issues are necessarily interpreted through partial and role-specific perspectives.

Winch (2010) further situates this asymmetry within the context of construction project organisations. He notes that projects bring together multiple professional communities, each with its own knowledge base, priorities, and evaluative criteria. In such settings, the same emerging issue may be framed differently depending on whether it is viewed primarily as a technical constraint, a cost implication, a contractual risk, or a planning concern. These differences do not arise from disagreement about facts, but from the role-dependent salience of information.

Agency theory helps clarify how these information differences affect decision-making responsibilities. Jensen and Meckling (1976) argue that principals and agents typically operate with asymmetric information, as those responsible for execution possess more detailed knowledge than those responsible for approval. Applied to bouwteams, this implies that actors with formal decision authority often depend on information provided by others when assessing scope-related proposals. Even in cooperative settings, this dependency shapes how issues are framed, which aspects are emphasised, and how the consequences of potential scope changes are understood.

⁵Statement 1: It was usually clear which element of the project a scope change decision was about.

⁶Statement 6: Scope change decisions were systematically documented, including the reasons and approvals.

⁷Statement 9: The collaborative scope change process was documented, including the context like causes and consequences.

⁸Statement 21: Ambiguity in earlier bouwteam decisions creates accountability issues during the realization phase.

3.4.2. Behavioural Mechanisms Under Uncertainty

Decision-making on scope-related issues under uncertainty is shaped not only by how information is distributed across roles, but also by how individuals cognitively process and evaluate that information. Behavioural mechanisms help explain why scope-related discussions in collaborative project environments rarely follow fully rational or linear evaluation paths, and why earlier interpretations continue to influence later decisions.

Simon (1955) introduces the concept of bounded rationality to explain how individuals simplify complex decision situations by focusing on a limited subset of available information. Because decision-makers cannot process all relevant inputs simultaneously, they rely on heuristics and satisficing, selecting solutions that appear adequate rather than exhaustively optimal. In collaborative project settings, this leads actors to prioritise information that is most salient to their immediate responsibilities, while other implications may receive less attention. Empirical studies of project coordination show that such selective attention is embedded in everyday project practices, where shared artefacts and interactions guide what is noticed and acted upon (Whyte & Lobo, 2010).

Beyond cognitive limitations, behavioural research shows that individuals tend to evaluate change in ways that privilege stability over reconsideration. Kahneman and Tversky (1979) demonstrate that decision-makers exhibit loss aversion, attaching greater weight to potential losses than to equivalent gains, while Staw (1981) show that actors may persist with earlier decisions despite new information suggesting revision would be preferable. In bouwteam contexts, these mechanisms help explain resistance to scope adjustments that challenge established assumptions or prior agreements, and the continued influence of earlier interpretations even as project conditions evolve.⁹

Finally, behavioural mechanisms also help explain why informal and iterative decision-making persists despite its limited traceability. Under conditions of uncertainty, simplified and incremental decision-making can reduce cognitive load and support momentum in collaborative work. Empirical studies of collaborative contracting report that such practices are often perceived as efficient and productive, particularly when teams share a constructive working relationship (Suprpto, 2016).¹⁰

3.4.3. Role Expectations and Organisational Ambiguity

Scope-related decisions in bouwteam projects are not shaped solely by differences in information availability or individual behavioural tendencies. They are also influenced by how organisational roles are understood, enacted, and coordinated during collaborative design. While bouwteam agreements typically specify formal responsibilities and mandates, the day-to-day practice of multidisciplinary collaboration introduces ambiguity about who is expected to do what, when, and with what degree of authority. This subsection examines how role expectations and organisational structures interact to shape how participants interpret scope-related issues and decisions.

A central concept for understanding these dynamics is loose coupling. Orton and Weick argue that organisations often consist of subsystems that are responsive to one another while retaining substantial autonomy in their internal logics, priorities, and interpretive frames (Orton et al., 1990). In bouwteams, functions such as technical management, contract management, and project management can be understood as such loosely coupled subsystems. Although these roles interact closely during design development, each maintains its own professional orientation and criteria for relevance. As a result, the same scope-related discussion or design issue may be interpreted differently depending on the role from which it is viewed. Loose coupling thus provides a structural explanation for why shared interactions do not automatically produce shared interpretations.

Organisational ambiguity is further reinforced by the tendency of organisations to decouple formal structures from operational practice. Meyer and Rowan (1977) show that under conditions of uncertainty, organisations often maintain formal procedures, documentation frameworks, and process descriptions as symbolic expressions of rationality, while actual behaviour diverges from these structures. In bouwteam contexts, this may occur when formal scope-change procedures exist on paper, yet multidisciplinary

⁹Statement 5: The decision-making arrangements set at the start of the bouwteam were consistently followed during the process.

¹⁰Statement 12: Scope changes that developed naturally, without strict go/no-go decisions, were often more efficient and productive.

discussions proceed informally and decisions effectively emerge through interaction rather than through explicitly sequenced initiation, assessment, decision, and implementation steps. Such decoupling increases ambiguity about the status and binding character of scope-related agreements.

Building on the behavioural mechanisms discussed above, bounded rationality also affects how organisational roles interpret scope-related information. Actors tend to focus on aspects of a discussion that are most salient within their own responsibilities, which means that different roles may reasonably assign different meanings to the same interaction. What one participant experiences as routine design coordination may therefore be understood by another as a decision that modifies the project scope and ought to be formally anchored. When such differences in interpretation are not made explicit at the moment they arise, it becomes difficult to establish who initiated a scope-related change, when it occurred, and on what grounds—thereby complicating the attribution of responsibility at later stages of the project.¹¹

3.4.4. Authority and Decision Rights

Divergent interpretations of scope-related decisions are shaped not only by differences in information and behaviour, but also by how authority and decision rights are understood within the project organisation. Formal allocations of authority define who is officially entitled to approve or reject scope changes, yet they do not necessarily determine how participants interpret the status, weight, or binding character of statements made during collaborative interaction.

Aghion and Tirole (1997) distinguish between formal authority and real authority. Formal authority refers to the contractual allocation of decision rights, specifying which actors are authorised to make binding decisions. Real authority, by contrast, reflects the practical influence actors derive from their expertise, involvement, or informational position.¹² In contexts characterised by technical complexity and uncertainty, formal decision-makers often depend on others to interpret the implications of proposed changes. This dependency causes practical influence to gravitate toward those with specialised knowledge rather than those holding formal mandate.¹³

These ambiguities are reinforced by the organisational conditions discussed in the previous subsection, in which formal role definitions coexist with informal coordination practices. Rather than displacing formal authority, informal influence operates alongside it, shaping how scope-related issues are framed and understood. Decision rights therefore function not only as procedural rules, but also as interpretive cues that participants use to assess whether a particular agreement carries decision status—for example, whether a statement made during a technical discussion should later be treated as advice, a provisional understanding, or a binding scope decision.

From an analytical perspective, the distinction between formal and real authority helps explain why scope-related decisions may later be interpreted differently across roles. While formal authority provides a reference point for accountability, real authority shapes how decisions are experienced and understood during collaboration. Where these two forms of authority do not align clearly, scope-related decisions may acquire ambiguous meaning, particularly when they must be interpreted beyond the context in which they were originally discussed.

3.5. The Bouwteam–Execution Interface

Scope-related decisions in bouwteam projects are typically formed under a collaborative, design-oriented governance regime. In this regime, decisions are often provisional, contingent on developing information, and sustained through relational mechanisms such as trust, professional judgement, and real-time coordination. These features are not a governance failure but a functional response to uncertainty and interdependence. The interface to the execution phase becomes critical because the same decisions must subsequently function under a different regime: one in which obligations, authority, and accountability are primarily structured through the execution contract and its associated control practices.

¹¹Statement 25: When it is unclear who initiated a change during the bouwteam—or when and why—it becomes difficult to determine responsibilities later on.

¹²Statement 3: It was clear who had the authority to make final decisions on proposed scope changes.

¹³Statement 4: Decisions about scope changes were often made by whoever happened to be most involved, rather than by the formally responsible party.

This phase transition is not merely a procedural handover; it constitutes a regime shift in how decisions acquire meaning and consequences. The execution contract necessarily operates as a control framework: it fixes baselines, specifies performance requirements, allocates risk, and formalises decision rights and escalation paths (Winch, 2010). Yet, contractual specifications cannot fully encode the contextual rationale, assumptions, and interpretive understandings that underpin many design-phase agreements. Because contracts are structurally incomplete in complex projects, residual ambiguity and unforeseen conditions remain and must be governed through interpretation, renegotiation, and adaptation rather than purely through *ex ante* specification (Macneil, 1980; Williamson, 1985).

As a consequence, the transition produces three interrelated shifts that directly affect scope-related decisions.

First, there is a governance shift. Coordination moves from exploration and joint problem-solving toward delivery, monitoring, compliance, and formal accountability. Decision-making becomes increasingly oriented toward protecting baselines and managing deviations through formally recognised change mechanisms rather than through informal adjustment (Turner & Keegan, 2001). This does not eliminate collaboration, but it changes which mechanisms dominate and which forms of evidence carry weight.

Second, there is an interpretive shift. The same design-phase agreement is no longer primarily interpreted as a working understanding within a collaborative setting, but increasingly as an input to contractual interpretation: as a requirement, an assumption, a deviation, or a potential variation. Formal and relational governance mechanisms may coexist, but they serve different functions: relational mechanisms support learning and adaptation, whereas formal mechanisms structure monitoring, enforcement, and accountability (Poppo & Zenger, 2002). When early decisions are not translated into artefacts that remain interpretable beyond their original context (e.g., baselines, decision records, linked rationales), their meaning becomes vulnerable to narrowing, contestation, or requalification under the execution regime.

Third, there is an accountability shift. Responsibilities that were diffusely shared or informally enacted during the *bouwteam* phase tend to crystallise in execution through formal role definitions, risk allocation, and liability regimes. This crystallisation can expose gaps between who influenced a decision (real authority) and who is held accountable for its consequences (formal authority), especially when documentation does not clearly establish decision status, rationale, and approval (Aghion & Tirole, 1997). In such situations, scope-related decisions may become focal points for disputes not because the original deliberation was irrational, but because the governance regime now requires decisions to be attributable, enforceable, and defensible.

The *bouwteam*–execution interface therefore represents a boundary condition for decision robustness. A scope-related decision is not robust merely because it produced alignment within the *bouwteam*; it is robust insofar as its meaning, status, and implications remain transferable when the governing logic shifts from relational coordination to contractual control. This transition, and the mechanisms through which decisions are anchored to survive it, provide the analytical basis for examining why some scope-related decisions remain stable across phases while others are reinterpreted, contested, or transformed into formal change and claim dynamics.

3.6. Governance Instruments

The preceding section showed that scope-related decisions become vulnerable not because informal coordination is deficient, but because decisions formed under a relational, design-oriented governance regime must continue to function once the governing logic shifts toward contractual control, accountability, and enforceability. Literature on project governance therefore identifies a range of governance instruments aimed at stabilising decision meaning at this interface. These instruments do not seek to eliminate informality or fully resolve contractual incompleteness; rather, they selectively anchor scope-related decisions once they acquire lasting significance, supporting their interpretability and transferability across project phases governed by different logics.

3.6.1. Documentation and Configuration Control

Within collaborative project environments, documentation functions as a governance instrument only insofar as it is integrated into everyday decision-making practices. Organisational research shows

that formal documentation systems do not automatically shape behaviour. Meyer and Rowan (1977) demonstrate that under conditions of uncertainty, organisations often decouple formal procedures from operational practice: documentation frameworks may exist to signal compliance or rationality, while actual decisions continue to emerge through informal routines. In such cases, documentation retains symbolic value but exerts limited influence on how decisions are shaped or maintained.¹⁴

A further limitation follows from the nature of control under uncertainty. Ouchi (1979) argues that bureaucratic control mechanisms depend on the ability to specify tasks and measure outcomes. In design-intensive and interdependent settings, such measurement is difficult, which weakens the behavioural force of formal documentation requirements. Teams therefore tend to rely on relational control based on trust and shared norms. While this supports collaboration, it reduces the consistency with which documentation is produced, maintained, and updated.

From a governance perspective, documentation and configuration control do not function as self-enforcing instruments. Their contribution to robustness depends on sustained ownership, clear expectations about use, and alignment with collaborative work practices. Where such alignment is absent, documentation structures risk becoming detached from the decisions they are meant to support.

3.6.2. Coordination and Communication Routines

Coordination and communication routines function as governance instruments by structuring how scope-related issues are surfaced, discussed, and collectively interpreted. Rather than stabilising decisions after the fact, such routines primarily influence the conditions under which decisions take shape. By shaping who is involved, when information is exchanged, and how issues are framed, coordination structures affect both the quality of decision-making and the extent to which participants can meaningfully contribute.

Research on project communication highlights that insufficient or fragmented communication structures can lead to superficial involvement. Ng et al. (2002) show that when communication channels do not adequately support interdisciplinary exchange, stakeholder participation may become nominal rather than substantive, resulting in situations of pseudo-involvement where actors are present but lack real influence.¹⁵ In contrast, interactive communication routines that combine formal meetings with opportunities for informal exchange improve engagement and support shared interpretation of emerging issues (Butt et al., 2016).^{16,17}

From an organisational perspective, coordination routines also determine how interdependent issue domains are handled. Galbraith (1974) emphasises that organisations must align their coordination mechanisms with the level of uncertainty and interdependence in their tasks. In bouwteams, design development involves tightly coupled technical, financial, and planning considerations. Without analytical separation of issues, discussions may conflate multiple concerns, increasing cognitive load and obscuring what is actually being decided.¹⁸ Coordination routines that explicitly structure issue separation—such as agenda setting, issue logs, or staged discussions—help prevent such conflation and support clearer collective evaluation.

As governance instruments, coordination and communication routines do not determine decision outcomes. Rather, they structure the interaction space in which scope-related issues are interpreted, negotiated, and prepared for formalisation. Their contribution to robustness therefore lies in preventing ambiguity and pseudo-involvement at the point of decision formation, rather than correcting deficiencies after decisions have been made.

3.6.3. Baselineing and Design Freeze

Baselineing and design freeze practices function as governance instruments by establishing explicit reference points against which subsequent changes can be identified, assessed, and controlled. Rather

¹⁴Statement 37: Effective scope change tools depend more on behavioral discipline and ownership than on new software.

¹⁵Statement 8: Contractors were sometimes only pseudo-involved in scope change decisions, having limited actual influence.

¹⁶Statement 7: Scope change decisions were prepared collaboratively, integrating the knowledge of each of the parties involved evenly.

¹⁷Statement 39: Central oversight of documentation by the client improves traceability but weakens joint ownership of decisions.

¹⁸Statement 2: Scope change discussions often mixed technical, financial and planning issues, making it unclear what the decision was really about.

than determining the content of decisions, these instruments stabilise the context in which scope-related decisions acquire meaning and remain transferable across phases. A baseline marks a formally recognised state of the design and associated assumptions, creating a shared point of departure for further development and control.

Ullman (2010) conceptualises design freeze as the moment at which a particular configuration of the design is treated as fixed for control purposes, such that any subsequent modification must be explicitly recognised as a change. In scope-related decision-making, this function is critical: without a clear baseline, it becomes difficult to distinguish between ongoing design development and substantive modifications to deliverables.¹⁹ Baselineing therefore supports interpretive clarity by anchoring discussions to a known and agreed reference state.

The effectiveness of baselineing and design freeze depends on their visibility and accessibility within everyday project practice. Whyte and Lobo (2010) show that shared artefacts and version-controlled documents create “visible decision spaces” in which participants can see which version of the design is current and how changes propagate across interconnected elements. In bouwteam contexts, where multidisciplinary interaction is continuous, such visibility helps maintain a common understanding of what has been agreed and what remains open.²⁰

As governance instruments, baselineing and design freeze do not eliminate uncertainty or resolve all ambiguities. Residual assumptions and unresolved issues may still be carried forward. Their contribution lies instead in structuring how uncertainty is managed: by fixing reference points, they make deviations explicit and support the transferability of scope-related decisions from the collaborative design environment to later phases governed by formal contractual control.

3.6.4. Tools and Methods for Implementation

Tools and methods provide the operational infrastructure through which scope-change governance is implemented in practice. Rather than shaping how decisions are made, they support traceability, consistency, and transferability by structuring how scope-related information is recorded, linked, and accessed over time.

Traceability tools form a first category of instruments. By linking scope-related decisions to underlying requirements, design assumptions, and contractual references, such tools help prevent scope drift and clarify whether a proposal constitutes a modification to deliverables or a refinement within the existing scope (Isaac & Navon, 2008).²¹ Increased formalisation, however, may also reduce perceived flexibility, illustrating a trade-off between accountability and collaborative ease.²²

Change registers and configuration-control systems constitute a second group of instruments. These tools formalise how scope modifications are logged, assessed, and synchronised across project documentation, supporting consistency across phases and reducing fragmentation of decision records (Mejl  nder-Larsen, 2017).²³

Shared repositories and digital workflows further support implementation by providing common access points for project artefacts and decision records. Whyte and Lobo (2010) show that such environments enhance coordination by making changes and their implications visible across organisational boundaries.²⁴

Finally, tools aimed at knowledge capture support the durability of scope-related decisions. Structured decision logs and recorded rationales preserve the context in which decisions were made, reducing the risk of later reinterpretation or dispute (Nikulina et al., 2022; Wang et al., 2019).²⁵

¹⁹Statement 36: Setting clear moments to freeze the design would help create structure for the transition to realization.

²⁰Statement 18: At all times throughout the bouwteam, the project team knew which version of the bouwteam documents was most recent.

²¹Statement 31: A tool that links requirements and scope would help prevent scope drift in bouwteam projects.

²²Statement 35: Digital traceability systems would improve accountability but can make collaboration overly formal.

²³Statement 32: A change register that documents every change and its implications for the contract documents would improve traceability across phases.

²⁴Statement 33: A shared knowledge repository would strengthen inter-organizational learning and accountability in bouwteam projects.

²⁵Statement 34: A structured way to record bouwteam decisions so that they stay valid in the realization phase would help prevent disputes.

Across these instruments, the literature emphasises that tools operationalise governance rather than replace it. Their contribution lies in reinforcing traceability and transferability, provided they are used consistently and embedded in everyday project routines.

3.7. Chapter synthesis and knowledge gap

This chapter examined scope-related decision-making in bouwteam projects as a socio-technical process that unfolds under uncertainty, distributed expertise, and time pressure, and that must subsequently remain interpretable once collaboration gives way to contractually governed execution. Across the reviewed streams, a consistent pattern emerges: early-phase scope decisions are often functionally stabilised through informal coordination, iterative alignment, and mutual adjustment, yet they become legally consequential only once they are required to operate beyond their original collaborative context—most notably at the transition into the realisation phase under UAV or UAV-GC. This transition constitutes an interpretive break. Decisions that previously served as “working agreements” must suddenly function as contractual reference points for responsibility allocation, liability exposure, and change entitlement. The robustness of scope-related decision-making in bouwteams therefore hinges less on the substantive content of individual decisions than on whether the rationale, assumptions, and boundaries of those decisions are made transferable across phases, roles, and governance regimes.

Synthesising the theoretical background, five recurring dimensions determine whether scope-related decisions can be transferred and re-interpreted with sufficient clarity at the contractual transition. These dimensions structure the subsequent contract analysis and anchor the empirical investigation.

1. Scope definition and deliverables - The literature indicates that scope ambiguity is not merely a technical deficiency but a governance condition that can enable flexibility in early collaboration while also generating downstream contestation when scope boundaries must be fixed and enforceable. Transferability therefore depends on whether scope is articulated not only as an intent or solution direction, but also as a set of deliverables, interfaces, assumptions, and exclusions that can function as an auditable reference when responsibilities crystallise.
2. Decision-making and documentation - Early decisions in collaborative settings are often produced through informal interaction and iterative alignment; however, their later interpretation depends on how those decisions were recorded, confirmed, and linked to their underlying rationale. Theoretical work on accountability, handover, and governance suggests that it is the *traceability* of decisions—what was decided, why, by whom, based on which information, and with which reservations—that determines whether decisions remain intelligible and defensible once the relational context dissolves.
3. Roles, responsibilities, and authority - Bouwteam arrangements redistribute influence during design development and blur the boundaries between advising, proposing, and deciding. Theory on project governance and role dynamics implies that transferability requires role clarity at the moment decisions are anchored: who had decision authority, who carried design responsibility, and which party accepted which consequence. Without such clarity, the transition to execution invites retrospective reframing of “shared” decisions as unilateral commitments or, conversely, as non-binding suggestions.
4. Liability and risk allocation at transition - The transition from bouwteam to execution changes the liability environment: what was previously tolerated as adaptive coordination becomes evaluated through contractual standards of performance, duty of care, and risk acceptance. Theoretical lenses on contractual governance and accountability imply that earlier decisions are requalified through the new liability regime. Transferability therefore depends on whether the implications of early decisions for risk and liability were made explicit and whether they are compatible with the execution contract’s allocation logic.
5. Change procedures and escalation - Scope decisions acquire enforceable meaning not only through their content but also through the procedural pathway through which they were made and can later be changed. Governance research emphasises that change control is a mechanism for preserving organisational coherence under uncertainty. In bouwteams, transferability depends on whether there are clear procedural arrangements for initiating, evaluating, deciding, and

confirming scope changes, and for escalating disagreements before they harden into claims during execution.

Taken together, these five dimensions characterise the conditions under which scope-related decisions move from collaborative alignment to contractually re-interpretable commitments. They provide a coherent analytical lens for examining how scope-related decision-making unfolds during the bouwteam phase and how it survives the transition into the realisation phase.

Knowledge Gap and Implications for the Research Design

While the theoretical background explains why scope-related decisions are vulnerable at the transition from design-oriented collaboration to contractually governed execution, it does not specify how this vulnerability is structurally shaped in bouwteam projects that proceed into UAV or UAV-GC. Three interrelated gaps remain.

First, existing work offers limited specification of how early-phase decisions become binding, contestable, or re-interpretable under the procedural and documentary arrangements typically used in Dutch bouwteam practice. Theory highlights the importance of documentation and accountability, yet it remains underdetermined which contractual provisions and documentary artefacts determine whether a decision is treated as an enforceable scope commitment rather than as a provisional agreement.

Second, the literature does not sufficiently connect the transition in governance regime to the concrete liability environment of UAV and UAV-GC, and thus to the interpretive consequences for earlier scope-related decisions. Theoretical accounts recognise a shift from relational to contractual governance, but they typically stop short of analysing how different contractual standards and allocations of responsibility reshape the meaning of earlier decisions at the moment of handover.

Third, conceptual work cannot on its own explain how practitioners from different roles evaluate the adequacy of scope decision records or how they prioritise speed and flexibility relative to traceability and robustness. Yet these role-based evaluations are decisive in practice, because they shape which decisions are anchored, how much formality is considered proportionate, and which uncertainties are tolerated during the bouwteam phase.

These gaps motivate the empirical and contractual focus of the remainder of the thesis. Chapter 5 examines how DG2020 and the execution regimes (UAV and UAV-GC) structure scope-related decision-making and its transferability along the five dimensions identified above. Chapter 6 and Chapter 7 then investigate how professionals interpret and evaluate these issues through the Q-method study, and how role-based perspectives help explain why the same decision practices are experienced as either enabling or risky. Finally, the framework development translates the combined theoretical, contractual, and empirical insights into governance mechanisms aimed at improving clarity, traceability, and transferability of scope-related decisions in bouwteam projects.

Methodology

This chapter sets out the methodological approach adopted to investigate how scope-related decisions are formed, recorded, and interpreted in bouwteam projects, and how these decisions acquire contractual meaning at the transition to the realisation phase under UAV or UAV-GC. Building on the theoretical analysis, the methodology is designed to examine both the formal contractual structures that govern scope-related decision-making and the professional interpretations through which such decisions are evaluated in practice.

The theoretical background demonstrated that scope-related decisions in bouwteam arrangements typically emerge through iterative interaction, informal coordination, and distributed expertise, whereas their significance becomes fixed and enforceable only once execution is governed by a contractual regime that defines responsibilities, liabilities, and procedural requirements. The methodological focus therefore lies on this transition, where collaboratively formed decisions must be reinterpreted within a legally binding environment and where deficiencies in clarity, traceability, or role attribution become consequential.

To address this interface, the research adopts a mixed-method design consisting of two complementary empirical components. First, a qualitative contract analysis examines how scope definition, decision-making procedures, documentation requirements, and liability allocation are formally structured in the DG2020 bouwteam agreement and in the UAV and UAV-GC execution regimes. Second, a Q-methodological study captures how professionals involved in bouwteam projects perceive and evaluate scope-related decisions and their documentation, identifying shared perspectives across different roles and responsibilities.

Rather than treating these methods as separate strands, their findings are systematically integrated. The combined insights from the contract analysis and the Q-method study form the basis for deriving design principles that inform the development of a governance framework aimed at improving the clarity, traceability, and transferability of scope-related decisions in bouwteam projects. Figure 4.1 provides an overview of the overall methodological process.

The remainder of this chapter elaborates on each methodological component in turn, followed by the synthesis of findings and the subsequent framework development. The empirical results are presented sequentially in Chapters 5 and 6, synthesised in Chapter 7, and translated into a governance framework in Chapter 8.

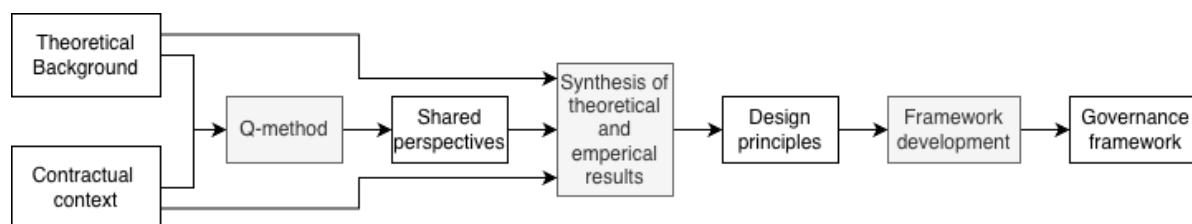


Figure 4.1: General methodological process

4.1. Contract analysis

To examine how scope-related decisions are formally regulated across the bouwteam and realisation phases, a qualitative contract analysis was conducted of the DG2020 bouwteam agreement and the UAV and UAV-GC realisation contract forms. As these documents constitute formal and standardised documentary sources, the analysis followed the principles of qualitative document analysis as described by Bowen (2009). Document analysis involves the systematic review and examination of written materials in order to identify relevant provisions, understand their structure, and extract analytically meaningful information.

In this study, the contract analysis serves as a factual and descriptive method. Its purpose is to identify, structure, and compare how scope-related decisions, documentation requirements, roles, responsibilities, and change procedures are formally defined within the contractual frameworks.

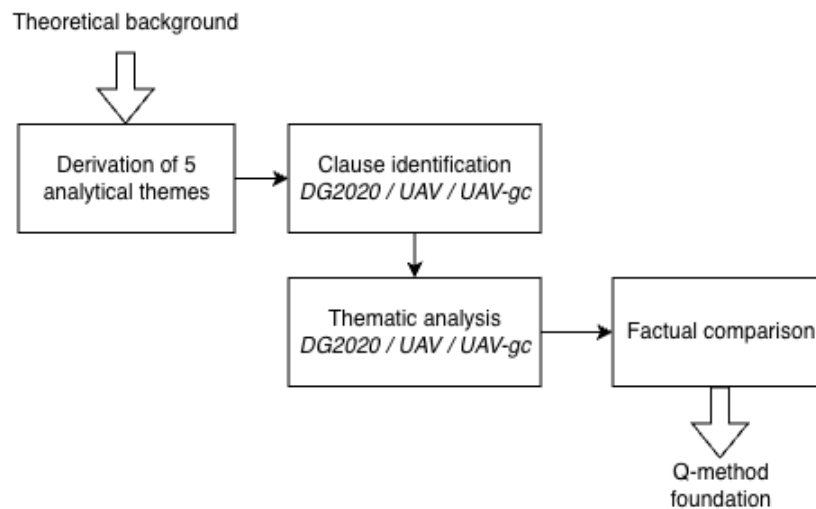


Figure 4.2: Contract analysis process

The contract analysis was conducted in three successive steps. First, relevant clauses were identified within each contract form that relate to the formal governance of scope-related decisions. Second, these clauses were examined within each contract using a consistent thematic structure to ensure systematic and transparent analysis. Third, the results of these thematic analyses were brought together in a factual comparison across DG2020, UAV, and UAV-GC, enabling similarities and differences in contractual regulation to be identified without interpretative or normative assessment.

4.1.1. Themes and analytical framework

To structure the clause identification, thematic analysis, and subsequent comparison, a thematic analytical framework was developed. This framework translates the conceptual focus of the theoretical background into a set of analytical themes that can be applied consistently across the three contract forms. The framework is methodological in nature: it defines which dimensions of the contracts are examined and ensures transparency and comparability in the analysis.

Five analytical themes were defined. Each theme captures a specific dimension through which contractual provisions shape the formal handling of scope-related decisions and their documentation at the interface between the bouwteam and execution phases:

1. Scope definition and deliverables — how project scope and required deliverables are defined, assigned contractual status, and modified, including the formal status of bouwteam deliverables at handover.
2. Decision-making and documentation — how decisions are procedurally taken and which forms of documentation acquire evidentiary or contractual value.
3. Roles, responsibilities, and authority — how tasks, decision authority, and accountability are

allocated between client, contractor, and other actors, and how these allocations change when execution begins.

4. Liability and risk allocation — how legal and financial responsibilities are allocated and transferred between phases.
5. Change procedures and escalation — how scope-related changes are initiated, formalised, and resolved, including escalation and dispute-resolution mechanisms.

Table 4.1 summarises the analytical framework, indicating the focus of analysis for each theme and the types of contractual indicators considered.

Table 4.1: Analytical framework for contract analysis

Theme	Analytical focus	Contractual indicators
Scope definition and deliverables	How scope and deliverables are defined, assigned contractual status, and modified, including the status of bouwteam deliverables at handover.	Provisions defining scope, deliverables, document hierarchy, annexes, and procedures for revising deliverables.
Decision-making and documentation	How decisions are procedurally taken and which forms of documentation acquire evidentiary or contractual value.	Clauses on meetings, minutes, approvals, acceptance, registers, notification duties, and document status.
Roles, responsibilities, and authority	Allocation of tasks, decision authority, and accountability across actors and phases.	Provisions defining duties, mandates, authorisations, coordination roles, and responsibility demarcations.
Liability and risk allocation	Allocation and transfer of legal and financial responsibilities between phases.	Provisions on liability, indemnities, responsibility for design, insurance, and risk allocation mechanisms.
Change procedures and escalation	Procedures for initiating, formalising, and resolving scope-related changes.	Provisions on variations, change orders, claims, dispute resolution, and escalation steps.

Using this framework, relevant clauses were identified and analysed within each contract form and subsequently compared in a structured and factual manner. The results of this comparison are presented in Chapter 5 and provide the contractual background for the empirical Q-methodological analysis that follows.

4.2. Q-methodology

To complement the contract analysis a Q-methodological study was conducted to examine how professionals involved in bouwteam projects interpret and prioritise these contractual arrangements in practice. Whereas the contract analysis provided a factual analysis, the Q-methodology identifies shared subjective viewpoints on how these arrangements are understood and enacted by different actors. The method yields factor arrays representing shared perspectives, together with consensus and distinguishing statements and the distribution of factor loadings across roles and cases. These outputs form a key empirical input for the subsequent synthesis. Figure 4.3 presents an overview of the Q-methodological process applied in this study.

4.2.1. Rationale and theoretical foundation

The Q-method was first introduced by Stephenson (1935), who proposed an inversion of the conventional R-technique of factor analysis. Instead of correlating tests or variables across large populations, Stephenson's approach correlates persons instead of tests, allowing the systematic study of subjectivity through the identification of shared viewpoints among individuals. This inversion enables the analysis

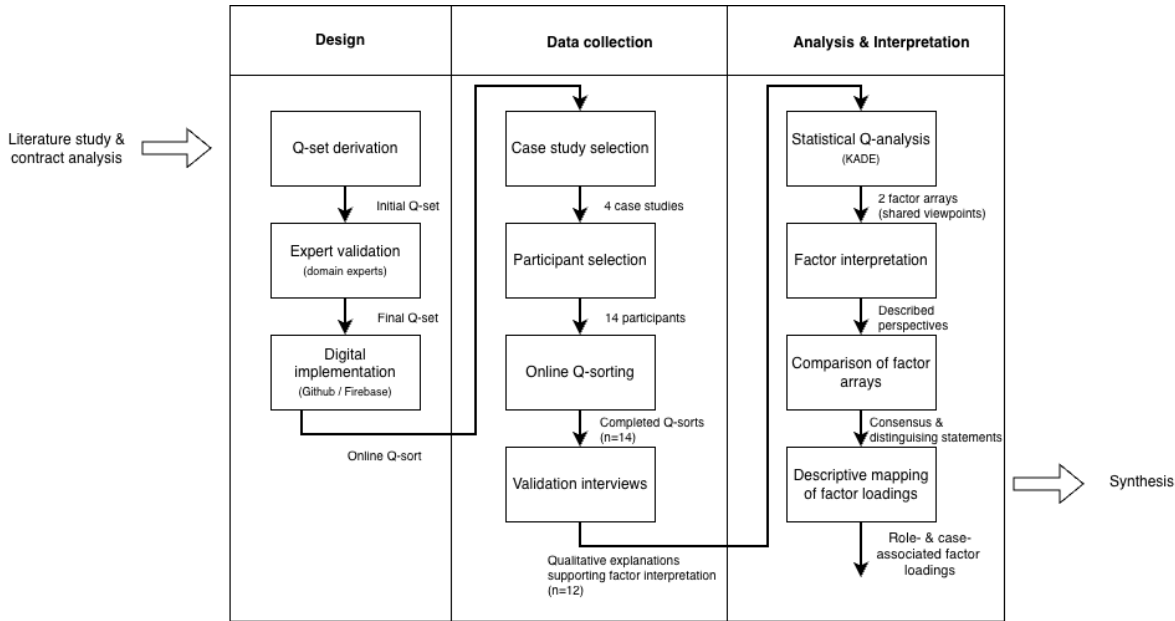


Figure 4.3: Q-methodological process applied in this study

of how people construct meaning and how these meanings cluster into coherent configurations of thought.

Building on this foundation, Watts and Stenner (2005) define Q-methodology as a mixed qualitative–quantitative (“qualiquantological”) technique that systematically identifies patterns of subjectivity. Participants rank a structured set of statements (Q-set) according to their agreement or importance, after which a by-person factor analysis groups participants who share similar configurations of meaning. Each resulting factor represents a distinct and interpretable viewpoint rather than a measurable trait. This makes Q-methodology particularly suitable for examining complex, socially contested topics—such as scope control and accountability in bouwteam projects—where multiple professional logics coexist.

4.2.2. Case study selection

The Q-study was situated within several bouwteam projects facilitated by Haskoning and selected through a purposive sampling strategy. The selection aimed to capture variation in project context, organisational setting, and professional roles involved in bouwteam scope-related decision-making, rather than to compare contractual forms as such. All selected projects were formally organised as bouwteams under DG2020, providing a shared collaborative context in which scope-related decisions were developed.

The projects differed in their subsequent realisation arrangements and project characteristics, including type, scale, and organisational complexity. This variation was intentionally retained to support the identification of shared and contrasting perspectives on scope-related decision-making and documentation across different practical contexts. The selection was further guided by pragmatic considerations, including recent project completion, accessibility through the researcher’s collaboration with Haskoning, and the availability of participants who had been directly involved in bouwteam scope-related decisions.

In total, fourteen participants—evenly distributed across four projects—were involved. Participants represented a range of roles, including project managers, technical managers, and contract managers, ensuring coverage of different professional perspectives within the bouwteam setting. An overview of the selected cases and their key characteristics is provided in Appendix B. Together, these cases form a suitable empirical context for examining how scope-related decisions are perceived and prioritised by different actors within bouwteam projects.

4.2.3. Statement development (Q-set)

The Q-set was developed through a structured and iterative process, integrating insights from the bouwteam context, the theoretical framework, and the contract analysis. The objective was to construct a representative and balanced set of statements capturing how professionals conceptualise, interpret, and evaluate scope-change governance in bouwteam projects.

Statement derivation

An initial longlist of statements was compiled from three complementary sources:

1. empirical and conceptual insights derived from the bouwteam model context;
2. theoretical mechanisms related to scope-change decision-making, contractual transitions, and governance instruments;
3. relevant clauses and interpretative issues identified in DG2020, UAV 2012, and UAV-GC 2005.

Each preliminary statement was grounded in one or more specific sources and reformulated to reflect a scope-related decision-making perspective within the bouwteam phase. A complete overview of the resulting statements and their source attribution is provided in Appendix C. Individual statements are referenced throughout Chapters 2, 3, and 5.

Expert validation

The preliminary Q-set was reviewed through validation interviews with three experts from Haskoning who possessed extensive experience with bouwteam contracts. Their feedback addressed wording clarity, redundancy, and conceptual balance across the thematic domains of the study. Based on their comments, the Q-set was refined through an iterative process of revision and consolidation, resulting in the final version used in the online sorting exercise.

Digital implementation

The final Q-set was implemented using the *EQ-Configurator* software hosted in a GitHub environment. The online Q-sort interface was deployed through Firebase, which handled secure data collection and storage. This workflow ensured full traceability and data integrity. The collected Q-sorts were subsequently imported into *KADE*, a dedicated Q-methodology platform, for further analysis.

4.2.4. Participant selection (P-set)

Seventeen participants were selected in consultation with the case-study contacts in an attempt to achieve the best possible coverage of relevant professional perspectives within each project. Selection targeted individuals directly involved in bouwteam decision-making, representing key roles such as contract managers, technical managers, project managers, and project control managers.

Given the focus of Q-methodology on diversity rather than statistical representativeness, the total of seventeen participants provided a sufficient empirical basis for identifying shared patterns of interpretation (Watts & Stenner, 2005). Participation was voluntary, and all respondents were informed of the study's objectives and assured of confidentiality. Fourteen of the seventeen selected participants completed a digital Q-sort, and twelve of them subsequently participated in a validation interview.

4.2.5. Validation interviews

For twelve of the fourteen completed Q-sorts, a brief post-sort validation interview was conducted. These interviews served two purposes: (1) to clarify the reasoning behind the placement of statements at the extreme ends of the distribution (i.e. -4, -3, +3, +4), and (2) to verify that the participant's interpretation of key statements was consistent with the perspective expressed in their overall Q-sort configuration. The qualitative input from these interviews enriched the subsequent factor interpretation and strengthened interpretive validity.

Before each interview, the researcher examined the participant's completed Q-sort to identify thematic patterns. These themes were derived directly from the participant's own ranking of statements (e.g., consistently strong agreement or disagreement within a conceptual domain such as decision-making clarity or documentation practices). This preparatory step ensured that the interview could focus on the participant's reasoning rather than reconstructing the Q-sort during the conversation. Project

characteristics, as presented in Appendix B, were considered only to contextualise participants' remarks and to support a more fluent dialogue.

The interviews themselves followed a conversational, participant-led format. The discussion centred on the themes identified beforehand and on the extreme-ranked statements, allowing participants to articulate their reasoning in an open and unstructured manner. Interviews were automatically transcribed using Microsoft Teams; the transcripts were subsequently verified by the researcher for accuracy.

Each transcript was then condensed into an analytical summary. These summaries highlight the participant's main explanatory themes and the arguments they provided for their extreme placements. The resulting summaries for all respondents are included in Appendix E.

4.2.6. Data analysis and factor interpretation

All Q-sorts were analysed in KADE using by-person factor analysis following established Q-methodological procedures (Brown, 1980). Intercorrelations between Q-sorts were calculated using the Pearson product-moment coefficient (see Appendix D), producing a correlation matrix that served as the basis for factor extraction. Factors were extracted using the classical centroid method, which is standard in Q-methodology and designed to support interpretive rotation rather than strict optimisation (Brown, 1980).

The number of retained factors was determined using multiple criteria recommended by Brown: eigenvalues above 1.0, the presence of several significantly loading exemplars, conceptual coherence of factor arrays, and the scree-plot inflection point. Across all criteria, a two-factor solution was the only defensible outcome for this dataset ($n = 14$).

After extraction, the factor solution was rotated using orthogonal varimax rotation to obtain the clearest and most interpretable structure (Watts & Stenner, 2005). Varimax redistributed variance across factors such that each Q-sort loaded strongly on one factor and weakly on others, enhancing the distinctiveness of the resulting shared viewpoints.

Factor loadings were evaluated for statistical significance using the conventional threshold loading = $z/\sqrt{N}$ (see Appendix D), where N is the number of statements. With $N = 41$, the threshold for $p < 0.01$ is approximately 0.40. Only Q-sorts exceeding this threshold were retained as *factor exemplars*, forming the empirical basis for each factor.

For each factor, KADE computed standardised z-scores and the corresponding factor arrays, representing ideal-typical Q-sorts associated with each shared perspective. These arrays constitute the primary empirical output of the statistical analysis and formed the basis for subsequent interpretation. The internal structure of each factor array was examined by identifying consensus and distinguishing statements, clarifying which viewpoints were shared across factors and which were factor-specific.

Next, factor arrays were compared to highlight differences in emphasis between perspectives based on the relative positioning of statements, without interpretation beyond the observed ranking patterns. Finally, factor loadings were descriptively mapped across cases and professional roles to contextualise where each shared perspective was represented. Qualitative explanations from the validation interviews were used solely to support and clarify the statistical patterns observed.

The outputs of these analytical steps consist of (i) described factor perspectives, (ii) consensus and distinguishing statements, and (iii) role-, stakeholder-, and case-associated factor loadings. These results are presented in Chapter 6 and form the empirical input for the subsequent synthesis with contractual and theoretical insights.

4.3. Synthesis

The synthesis constitutes an integrative analytical step in which insights from governance and decision-making theory, the contract analysis, and the Q-methodological study are systematically brought together. Rather than functioning as a separate empirical method, the synthesis serves to relate the formally defined contractual arrangements to the shared perspectives identified among practitioners, using theory as an interpretative lens. The aim of this step is to identify points of alignment and tension

between formal governance structures and how scope-related decisions are perceived and prioritised in practice.

As illustrated in Figure 4.4, the synthesis draws on three primary inputs: (i) the factual findings of the contract analysis (DG2020, UAV, and UAV-GC), (ii) the empirical outputs of the Q-method, including shared perspectives, consensus and distinguishing statements, and the distribution of factor loadings across roles, stakeholders, and cases, and (iii) relevant governance and decision-making theory. The synthesis was conducted through a structured comparison in which contractual provisions were used as a reference frame against which the Q-method results were examined. This comparison enabled recurring patterns, frictions, and interpretative gaps to be identified without introducing additional empirical analysis.

The outcome of the synthesis is a set of analytically grounded insights into how scope-related decision-making unfolds across the bouwteam and execution phases. These insights provide the conceptual basis for the design principles presented in the synthesis chapter and form the starting point for the development of the governance framework described in the following section.

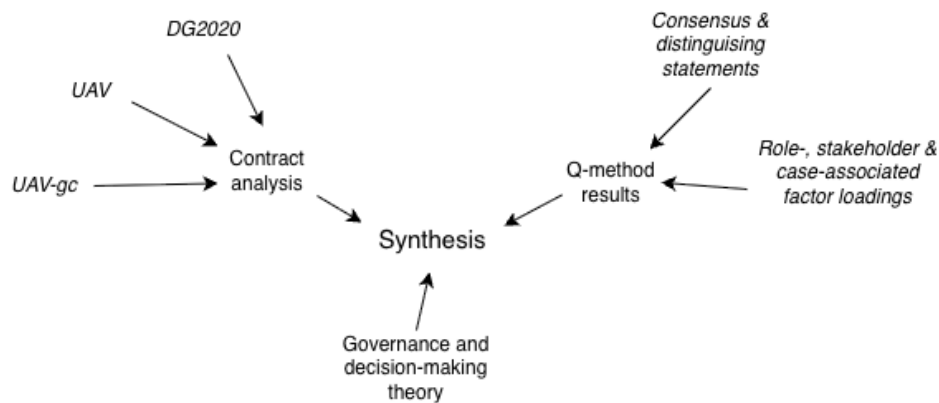


Figure 4.4: Overview of the synthesis step and its analytical inputs

4.4. Framework Development

This section describes how the insights generated in the synthesis were translated into a coherent governance framework. Framework development did not constitute a separate empirical method, but a constructive analytical step within the research design. Its purpose was to operationalise the design principles derived from the empirical and contractual analysis into a structured governance logic applicable in bouwteam practice.

An initial framework structure was developed to reflect the identified governance vulnerabilities, commitment dynamics, and phase-transition effects observed in the synthesis. The framework was designed to translate these analytical findings into practical assessment layers, decision levels, and supporting record types. This translation followed an abductive logic: empirical findings informed design principles, which were subsequently structured into an operational governance model.

The preliminary framework was subjected to a structured expert validation round with an external domain expert experienced in bouwteam governance and contractual transitions. Feedback focused on conceptual clarity, internal consistency, proportionality of the articulation levels, and practical usability in project settings. Based on this input, the framework was refined, particularly with regard to terminology, level differentiation, and the scope of supporting records. An overview of the expert feedback and the resulting adjustments is provided in Appendix G.

The resulting framework is presented in Chapter 8 as the operationalisation of the design principles derived in this study.

Contractual Comparison

This chapter examines how the contractual frameworks relevant to bouwteam projects organise scope, decision-making, roles and responsibilities, liability, and change governance. Drawing on the five themes identified in the theoretical background—(1) scope definition and deliverables, (2) decision-making and documentation, (3) roles and responsibilities, (4) liability and risk transfer, and (5) change mechanisms and escalation—the chapter provides an analytical structure for comparing DG2020, UAV 2012, and UAV-GC 2005.

The purpose of this chapter is descriptive: it sets out the factual provisions contained in each framework without evaluating their implications or anticipating their effects in practice. For each theme, the relevant clauses in DG2020, UAV 2012, and UAV-GC 2005 are presented, followed by a concise factual comparison. After the thematic analyses, the chapter concludes with an overall summary of how the three frameworks differ in their organisation of scope, authority, documentation, responsibilities, liability, and change-related procedures. This contractual overview provides the basis for subsequent chapters, which examine how scope change decisions made during the bouwteam phase interact with the requirements of the execution phase.

5.1. Theme 1 – Scope Definition and Deliverables

DG2020. DG2020 defines the bouwteam's purpose as preparing the project documents that form the basis for the subsequent execution phase (§3.2 and §3.5). The bouwteam scope therefore consists of the total set of deliverables agreed at the outset. These typically include (A) a design document (VO, DO, or bestek depending on the starting point), (B) a preliminary execution planning indicating sequencing and durations, (C) a jointly maintained risk dossier, and (D) supporting documents such as cost estimates, construction methodologies, and BLVC-plans. When the deliverables meet the agreed requirements, the client confirms their adequacy in writing (§12.1), after which negotiations for the execution contract begin (§12.8). DG2020 contains no formal mechanism for transferring these documents into the contractual framework of the following phase.

UAV 2012. Under UAV 2012, the scope is defined primarily through the specification (bestek), drawings, and other prescribed data (§1 and §2). These documents jointly form the legally binding description of the work, supported by norms and statutory requirements that are deemed part of the contract (§2(3)). The client must supply the defining information, permits, and prescribed methods (§5), while the contractor must execute strictly according to the approved drawings and instructions (§6). Execution deliverables include the required work programme (§26), weekly progress reports (§27), measurements (§28), deviation reports (§29), and construction material documentation (§17–22). Once the work is completed, all deliverables are formalised at the moment of handover in accordance with §12.

UAV-GC 2005. Under UAV-GC 2005, the project scope is fixed in the *vraagspecificatie* (§1(q)), which sets out all functional and performance requirements. With its annexes and referenced documents, the *vraagspecificatie* forms the binding contractual description of the work (§1(a)). Only documents explicitly incorporated into this dossier acquire legal force, meaning that bouwteam documents must be formally annexed to become binding. This framework turns collaboratively developed scope elements into a closed, enforceable performance specification. Any later adjustments to the scope must follow the written change procedures in §14 and §15.

Factual comparison. DG2020 treats scope as a set of collaboratively developed deliverables that evolve during the bouwteam. UAV 2012 defines scope through a traditional combination of specification, drawings, and prescribed client data, complemented by execution documentation such as planning, reports, and measurements. UAV-GC 2005 fixes scope within a legally bounded *vraagspecificatie* and its annexes, requiring explicit incorporation of all documents. Whereas DG2020 provides no formal transfer mechanism, UAV 2012 and UAV-GC 2005 both rely on a closed set of contract documents, though UAV-GC 2005 applies a stricter requirement for explicit annexation and written change procedures.

5.2. Theme 2 – Decision-Making and Documentation

DG2020. Decision-making under DG2020 is intended to occur on the basis of equality but remains subject to formal client approval. Decisions can be adopted by majority vote provided the client agrees (§9.2), even if individual participants dissent. Each meeting must produce written minutes documenting decisions, discussion points, and actions (§9.3). These minutes ensure decision visibility but only become legally binding when explicitly confirmed or signed. DG2020 thus offers a pragmatic administrative structure for coordination but leaves the enforceability of decisions dependent on later confirmation or inclusion in follow-up contracts.

UAV 2012. Decision-making in UAV 2012 is organised around the authority of the director (§3)²⁶, who issues instructions, approvals, and determinations on behalf of the client. The contractor must appoint an authorised representative (§4) to ensure decisions are legally valid. Several mechanisms structure formal documentation: mandatory weekly progress reports (§27), warnings regarding errors in client-provided documents (§6(14)), deviation notifications (§29), and jointly signed *process-verbaal* for disputed or sensitive facts (§48). These instruments ensure that decisions, instructions, deviations, and objections are systematically recorded and can be relied on during execution.

UAV-GC 2005. UAV-GC 2005 prescribes a hierarchical and formalised approval system. The client retains ultimate authority through written acceptance and approval procedures (§22–§23), and only documents and decisions that have been explicitly accepted in writing and included in the *vraagspecificatie* acquire binding contractual value. Decision-making therefore depends entirely on formal written validation rather than collaborative documentation.

Factual comparison. DG2020 relies on majority-based decision-making supported by meeting minutes, but these records are not legally binding unless explicitly confirmed or signed. UAV 2012 structures decision-making through the director's authority, mandatory weekly reports, deviation notices, and formal warnings, resulting in a more systematic documentation regime. UAV-GC 2005 applies the most stringent formalism: only written approvals that are explicitly annexed to the contract are binding. Across the three systems, the degree of procedural formality increases from DG2020 to UAV 2012 and is strictest under UAV-GC 2005.

5.3. Theme 3 – Roles and Responsibilities

DG2020. DG2020 assigns the client responsibility for leading and coordinating the bouwteam (§5–§6), while all participants contribute to the joint development of the project documents. Section 7 defines the general obligations of all non-client participants, including timely performance of assigned tasks, attendance at meetings, and providing professional input on design, planning, risk, safety, and environmental matters. Section 8 specifies the contractor's advisory duties, such as providing expertise on construction methods, preparing cost estimates, coordinating technical input, and contributing to planning. While these responsibilities are contractually defined and legally enforceable, they are operationalised through collaborative and relational interaction rather than through hard result obligations. This arrangement aligns with the advisory liability regime under DNR 2011 (§11.2), in which liability is based on a duty of care and contractually limited, rather than on guaranteed outcomes.

UAV 2012. Under UAV 2012, roles follow a traditional division between client and contractor. The client, represented by the director (§3), is responsible for supplying the defining project information, permits, prescribed methods, and essential data (§5). The contractor carries broad execution duties under §6,

²⁶Statement 24: In the realization phase, formal lines of authority leave limited space to maintain the open consultation that characterized the bouwteam.

including performing the work in accordance with drawings and instructions, ensuring quality, safety, and legal compliance, managing materials, coordinating with third parties, and maintaining the site. The contractor is responsible for managing personnel and subcontractors (§6(8–9)) and must warn the director of errors in client-provided information (§6(14)). Additional responsibilities arise from material quality requirements (§17–22) and execution obligations such as setting out, safety, and coordination (§28–32).

UAV-GC 2005. UAV-GC 2005 imposes a clear and hierarchical allocation of responsibilities. The client is responsible for the content and correctness of the *vraagspecificatie* (§3), while the contractor bears full design and execution responsibility under a result obligation (§4). The contractor must ensure that all contractual and functional requirements are met and must warn the client in writing of any perceived deficiencies or inconsistencies in the *vraagspecificatie* (§4(7)). This structure places responsibility for design adequacy, technical coordination, and risk identification squarely with the contractor once the contract enters into force.

Factual comparison. DG2020 distributes responsibilities across participants in an advisory and collaborative manner, with the client coordinating and the contractor contributing expertise under advisory liability. UAV 2012 applies a traditional separation of roles in which the client prescribes key information and the contractor executes the work under broad statutory and contractual duties. UAV-GC 2005 assigns the most extensive responsibilities to the contractor, who becomes fully responsible for both design and execution and must actively identify and report deficiencies in the client's requirements. Across the three frameworks, responsibility moves from shared advisory duties (DG2020) to traditional execution duties (UAV 2012) and finally to full design-and-build responsibility (UAV-GC 2005).

5.4. Theme 4 – Liability and Risk Transfer

DG2020. Liability under DG2020 is contractually limited but not excluded, and is structured around an advisory duty of care rather than a result obligation. The contractor's role aligns with the DNR 2011 framework (§11.2), under which liability may arise from professional negligence and is proportionate to the contractor's contribution to the advisory work performed, typically restricted to direct damage. While §11.4 clarifies that participation in collective *bouwteam* decision-making does not in itself create liability for collective outcomes, this does not preclude liability for individual errors, omissions, or unprofessional advice provided during the *bouwteam* phase. Section 11.1 further stipulates that the client indemnifies the contractor against third-party claims, reinforcing the advisory character of the engagement. At the same time, DG2020 provides no mechanism for explicitly transferring *bouwteam*-related decisions or associated liability positions into the subsequent execution contract, a gap explicitly acknowledged in the footnote to §11.2, which warns parties to address the treatment of *bouwteam*-related deficiencies when drafting the UAV-GC 2005 contract.²⁷²⁸

UAV 2012. Liability in UAV 2012 follows a traditional construction contract model. The contractor is liable for damage resulting from negligent execution (§6(7–9)), for the actions of personnel and subcontractors (§6(8–9)), and for defects unless they arise from extraordinary circumstances or client-prescribed errors. Under the warning duty (§6(14)), failure to report evident inaccuracies in client-provided information results in contractor liability. Additional risk components include responsibility for materials until incorporation (§20), for quality and guarantee obligations (§17–22), and for damage to the work during execution (§44), with limited relief in cases of unforeseeable and non-attributable circumstances (§47). Post-completion liability follows BW 7:758 (§12).

UAV-GC 2005. UAV-GC 2005 applies an integrated contracting model in which the contractor bears extensive responsibility for design and execution. Liability for defects and damages lies primarily with the contractor, except where failures can be attributed to the client or extraordinary circumstances (§28, §41). Scope or requirement changes only adjust liability when formally ordered under §14 or accepted under §15.²⁹ Unforeseeable conditions are narrowly defined and provide limited grounds for relief

²⁷Statement 27: The execution of scope changes originating from the *bouwteam* often begins before they are formally approved, making them difficult to trace after handover.

²⁸Statement 30: Price and liability negotiations at the transition from *bouwteam* to realization often reopen earlier *bouwteam* decisions.

²⁹Statement 26: Without formal approval of *bouwteam* decisions, it becomes difficult to hold parties accountable once the realization phase begins.

(§44). Since the contractor holds a comprehensive result obligation, risk transfer is strict and primarily dependent on the contractor's adherence to formal warning (§4(7)), approval, and documentation procedures.

Factual comparison. DG2020 applies an advisory liability framework with proportionate and limited obligations, and with indemnification for third-party claims. UAV 2012 introduces a traditional construction liability regime in which the contractor bears responsibility for negligent execution, material quality, site safety, and damage to the work, subject to exceptions for client-caused errors and extraordinary circumstances. UAV-GC 2005 establishes the strictest allocation of risk, with the contractor assuming full design-and-execution liability and limited opportunities for relief unless changes or conditions are formally documented. Across the three frameworks, liability shifts from limited advisory liability (DG2020) to conventional execution liability (UAV 2012) and finally to comprehensive result liability (UAV-GC 2005).

5.5. Theme 5 – Change Mechanisms and Escalation

DG2020. DG2020 encourages joint evaluation and collaborative adjustment of bouwteam deliverables but contains no formalised procedure for approving, documenting, or authorising scope changes. Modifications typically arise through discussion during bouwteam meetings and are recorded in minutes, which provide administrative traceability but no binding force beyond the advisory context. Once the deliverables meet the agreed objectives, the client confirms their adequacy in writing (§12.1), after which the bouwteam phase ends and negotiations on price, risk allocation, and contractual terms commence (§12.8).

Even though UAV 2012 and UAV-GC 2005 contain extensive procedures for changes during the execution phase, only a subset of these provisions is relevant for understanding how scope decisions made during the design-oriented bouwteam phase are governed contractually. The paragraphs below therefore focus exclusively on those clauses that regulate changes, deviations, warnings, or approvals connected to design inputs, information correctness, and the formal acceptance of design-related decisions.

UAV 2012. UAV 2012 regulates design-related changes primarily through provisions governing the correctness, interpretation, and adjustment of client-provided information. Under §5, the client is responsible for supplying the defining design data and prescribed methods. The contractor must issue a formal warning under §6(14) when these data contain evident inaccuracies, which may prompt clarification or amendment. Deviations encountered during execution must be reported under §29, enabling the director to issue instructions that adjust the applicable design information. When deviations or facts relevant to scope interpretation require formal recording, the parties may establish a jointly signed process-verbaal under §48.

UAV-GC 2005. UAV-GC 2005 contains several provisions that directly structure changes to design requirements and design-related scope elements. Under §4, the contractor bears full design responsibility and must warn the client in writing of any perceived deficiencies or inconsistencies in the vraagspecificatie (§4(7)). Information-related deviations or ambiguities must be reported under §6, prompting clarification. Formal acceptance procedures under §22–§23 determine when design outputs or documents gain contractual status. Any change to design requirements—including modifications to functional demands or performance criteria—must be instructed or accepted through the written procedures of §14 (change orders) or §15 (contractor proposals). These mechanisms define how design decisions evolve during the pre-execution phase and how they become contractually embedded.

Factual comparison. DG2020 addresses changes to design-related scope elements through collaborative discussion without formal approval requirements. UAV 2012 regulates adjustments through warnings, deviation reporting, and instructions by the director, reflecting the client's responsibility for design. UAV-GC 2005 formalises design-stage changes through mandatory written warnings, information notifications, structured design acceptance procedures, and written change or proposal mechanisms under §14–§15. Across the three contracts, the approach to managing design-related scope decisions shifts from informal and discussion-based (DG2020) to client-directed clarifications (UAV 2012) and finally to a fully codified system of warnings, approvals, and written change or proposal procedures (UAV-GC 2005).

5.6. Contractual Summary and Comparison

Across the three contractual frameworks, DG2020, UAV 2012, and UAV-GC 2005 organise scope, decision-making, responsibilities, liability, and change governance in distinct and progressively more formal ways. DG2020 defines scope as a collaboratively developed set of design, planning, and risk documents, whereas UAV 2012 establishes scope through the specification, drawings, and prescribed client data, and UAV-GC 2005 fixes scope in a closed *vraagspecificatie* with binding annexes. Decision-making ranges from majority-based and informally recorded under DG2020, to director-led and administratively documented under UAV 2012, and to formally authorised and contractually annexed approvals under UAV-GC 2005. Responsibilities shift from shared advisory contributions in DG2020 to traditional execution duties under UAV 2012 and to full design-and-execution responsibility under UAV-GC 2005. Liability follows a parallel progression: DG2020 applies a limited advisory regime, UAV 2012 a conventional construction liability regime, and UAV-GC 2005 a comprehensive result-based regime. Design-related change governance similarly differs across the frameworks, moving from informal discussion in DG2020, to directed clarifications and deviation reporting in UAV 2012, and finally to codified warnings, design acceptances, and written change or proposal procedures in UAV-GC 2005. Together, these factual differences reveal a structured progression from collaborative preparation to traditional execution contracting, and ultimately to integrated design-and-build governance, providing the basis for further examination of how these contractual arrangements shape the handling of scope changes in practice.

Table 5.1: Overview of contractual provisions across five analytical themes

Theme	DG2020	UAV 2012	UAV-GC 2005
1. Scope definition and deliverables	Jointly prepared bouwteam outputs: design (VO/DO/bestek), planning, risk dossier, cost estimates, methodologies, BLVC. Scope develops collaboratively; no formal transfer mechanism to execution. (§3.2, §3.5, §12.1, §12.8)	Scope defined by specification (bestek), drawings, norms, statutory requirements; client supplies defining information and permits. Execution deliverables include planning, reports, measurements, and deviations. (§1–2, §5, §6, §17–22, §26–29)	Scope fixed in <i>vraagspecificatie</i> and annexes; only incorporated documents are binding. Scope changes require written procedures. (§1(a),(q), §14–15)
2. Decision-making and documentation	Decisions by majority vote with client approval; minutes required but binding only when explicitly confirmed. Documentation supports coordination but is not binding unless formally validated. (§9.2–9.3)	Decision authority vested in the director. Formal records include reports, warnings, deviations, and jointly signed statements for disputed facts. (§3–4, §6(14), §27, §29, §48)	High formalism: approvals binding only if written and annexed. Written communication may provide evidence but lacks binding status without annexation. (§22–23)
3. Roles and responsibilities	Client coordinates; contractor provides advisory input on design, planning, cost, risk, and methods under an advisory liability regime. (§5–8, §11.2)	Traditional allocation: client defines scope; contractor executes works and ensures quality, safety, coordination, and duty to warn. (§3–6, §17–22, §28–32)	Client responsible for <i>vraagspecificatie</i> ; contractor bears full design and execution responsibility, including duty to warn. (§3–4)
4. Liability and risk transfer	Limited advisory liability linked to professional duty of care; bouwteam participation does not create execution liability. Client indemnifies contractor for third-party claims. (§11.1–11.4)	Contractor liable for negligent execution, defects, personnel, and damage, unless caused by client prescriptions or exceptional events; duty to warn applies. (§6(7–9),(14), §17–22, §20, §44, §47, §12)	Full design-build liability with limited relief; liability tied to formal warnings, approvals, and written changes. (§4(7), §28, §41, §44)
5. Change mechanisms and escalation	No formal change procedure. Modifications arise through discussion and are recorded in non-binding minutes; client confirms deliverable adequacy at bouwteam end. (§9.3, §12.1, §12.8)	Adjustments handled via warnings, deviation reports, and instructions; no dedicated design-change procedure due to client design responsibility. (§5, §6(14), §29, §48)	Structured written mechanisms: warnings, deviations, acceptances, and change/proposal orders. Only formally instructed or accepted changes affect scope. (§4(7), §6, §14–15, §22–23)

Professional Perspectives on Scope-Related Decision-Making

This chapter presents the empirical outcomes of the study. The results are derived from a structured analysis of the Q-sort data and focus on identifying shared perspectives on scope-related decision-making in bouwteam projects, as well as examining how these perspectives relate to professional roles and project contexts. Interpretation of the findings in relation to theory and contractual arrangements is deliberately deferred to Chapter 7.

The empirical analysis combined quantitative and descriptive components to obtain a robust picture of practitioners' perspectives. First, the Q-sort data were subjected to by-person factor analysis using the Brown centroid extraction method followed by varimax rotation. This procedure groups respondents based on similarity in their ranking patterns, producing two stable and interpretable factors (eigenvalues > 1). Only significantly loading Q-sorts ($p < 0.01$) were retained as defining sorts. Factor interpretation focused on consensus statements and distinguishing statements, supplemented where relevant by highly salient rankings (± 3 and ± 4). Additional statistical details are provided in Appendix F.

Second, the distribution of factor loadings was descriptively mapped across projects and professional roles. This case–role mapping does not aim at statistical generalisation, but at identifying patterns that indicate how shared perspectives relate to organisational roles and project contexts. Throughout this chapter, findings are presented in a strictly empirical manner; their conceptual meaning and implications for governance are addressed in the synthesis chapter that follows.

6.1. Factor 1 – Pragmatic Confidence in Informal Governance

Factor 1 represents a perspective in which the scope change process during the bouwteam phase is experienced as functioning adequately and reliably, despite a predominantly informal mode of operation. Respondents loading on this factor express confidence that scope-related decisions are taken by the appropriate actors, understood by those involved, and sufficiently anchored to allow a smooth transition into the realisation phase. Within this perspective, the bouwteam is perceived to function as intended, not because procedures are rigidly followed, but because informal coordination is seen as effective and trustworthy.

The positively ranked statements indicate a strong sense of clarity regarding authority, decision scope, and the perceived sufficiency of documentation. Respondents do not interpret these characteristics as evidence of strict procedural control, but rather as confirmation that essential governance conditions are met. Authority is understood and respected, scope change decisions are perceived as coherent, and documentation is considered adequate for the purposes it needs to serve.

Conversely, the negatively ranked statements reveal what respondents explicitly do not experience as problematic. Confusion over the initiation of changes, premature execution without approval, or informal decision-making by the wrong actors are not seen as salient risks. Importantly, respondents do not associate the transition to the realisation phase with a loss of collaborative quality or openness, suggesting confidence that informal practices do not undermine later project stages.

Table 6.1: Factor Array for Factor 1 (salient statements only)

Q-sort Value	No.	Statement
+4	36	Setting clear moments to freeze the design would help create structure for the transition to realization.
+4	3	It was clear who had the authority to make final decisions on proposed scope changes.
+3	17	Every approved scope change was systematically implemented into the relevant bouwteam documents.
+3	1	It was usually clear which element of the project a scope change decision was about.
-4	13	It was often unclear who raised a change, when, and why.
-4	24	In the realization phase, formal lines of authority leave limited space to maintain the open consultation that characterized the bouwteam.
-3	27	The execution of scope changes originating from the bouwteam often begins before they are formally approved, making them difficult to trace after handover.
-3	4	Decisions about scope changes were often made by whoever happened to be most involved, rather than by the formally responsible party.

The factor array alone, however, should not be interpreted as a literal description of formalised practice. Insights from the validation interviews (Appendix E) clarify that respondents are well aware of the informal nature of decision-making during the bouwteam phase. For instance, interviewees describe scope-related discussions and decisions emerging through informal consultations, ad hoc coordination, and personal discipline rather than through systematically documented procedures. Formal documentation is often completed selectively or retrospectively, when considered necessary, rather than as a continuous process requirement.

Taken together, Factor 1 reflects a perspective of perceived control rooted in pragmatic confidence rather than formal compliance. Informality is not denied but embraced as a functional and efficient mode of governance, provided that key decisions are understood, accepted, and sufficiently anchored to avoid issues during realisation. From this viewpoint, the scope change process is not experienced as risky or insufficiently governed, but as appropriately balanced between flexibility and control. This underlying logic is captured in the label *Pragmatic Confidence in Informal Governance*.

6.2. Factor 2 – Fragile Informal Governance

Factor 2 reflects a perspective in which scope change governance during the bouwteam phase is experienced as predominantly informal, but insufficiently structured and inadequately anchored to ensure reliable continuity and interpretability of decisions across phases. Respondents loading on this factor describe a process in which scope-related discussions are fragmented, documentation is inconsistent, and formal roles and decision-making arrangements are not consistently enacted. While informality is recognised as an inherent and valuable characteristic of the bouwteam, it is experienced as insufficiently supported to ensure stability across phases.

The positively ranked statements reflect a strong concern with the consequences of insufficient structure and weak formal anchoring. Respondents emphasise that, without formal approval and disciplined documentation, accountability becomes problematic once the project transitions into the realisation phase. Scope change discussions are experienced as diffuse, as technical, financial, and planning considerations are intertwined without clear demarcation, making it difficult to determine what has been decided and on what grounds. Budget pressure further reinforces the perception that decisions are shaped by situational pragmatism rather than by a stable governance framework.

The negatively ranked statements point to the perceived origins of these vulnerabilities. Respondents

Table 6.2: Factor Array for Factor 2 (salient and significantly loading statements)

Q-sort Value	No.	Statement
+4	37	Effective scope change tools depend more on behavioural discipline and ownership than on new software.
+3	2	Scope change discussions often mixed technical, financial and planning issues, making it unclear what the decision was really about.
+2	26	Without formal approval of bouwteam decisions, it becomes difficult to hold parties accountable once the realization phase begins.
+2	20	Budget pressure often influenced how scope changes were framed or justified.
+2	27	The execution of scope changes originating from the bouwteam often begins before they are formally approved, making them difficult to trace after handover.
-4	9	The collaborative scope change process was documented, including the context such as causes and consequences.
-4	11	Scope changes followed a structured sequence: initiation, evaluation, assessment, decision, and implementation.
-3	5	The decision-making arrangements set at the start of the bouwteam were consistently followed during the process.
-3	14	Change proposals were reviewed early to avoid uncontrolled development and duplicate assessment work.
-2	3	It was clear who had the authority to make final decisions on proposed scope changes.
-2	17	Every approved scope change was systematically implemented into the relevant bouwteam documents.
-2	6	Scope change decisions were systematically documented, including the reasons and approvals.

do not recognise a consistent sequence for managing scope changes, nor do they experience early review or disciplined adherence to the decision-making arrangements agreed at the start of the bouwteam. Documentation is seen as incomplete or absent, and approved changes are not systematically incorporated into the bouwteam records. Authority is formally assigned but insufficiently enacted, resulting in ambiguity over responsibility and ownership.

Insights from the validation interviews (Appendix E) clarify that respondents do not object to informality as such, but to its unstructured and weakly governed application. Interviewees describe situations in which informal agreements and understandings dominate the scope change process, yet are not subsequently formalised. Unlike Factor 1, respondents here do not express confidence that informal practices are sufficiently disciplined to prevent problems during realisation. Instead, informal coordination is experienced as ad hoc, person-dependent, and vulnerable to misinterpretation once formal contractual responsibilities take effect.

Taken together, Factor 2 represents a perspective in which informal governance lacks the behavioural discipline, role clarity, and documentation necessary to ensure reliable scope transfer. Informality is not rejected, but its fragility is emphasised: without systematic anchoring and consistent enactment of responsibilities, scope-related decisions are perceived as exposed to dispute and reinterpretation during later project phases. This underlying logic is captured in the label *Fragile Informal Governance*.

6.3. Comparison of Perspectives Across Statements

This section compares the viewpoints represented by Factor 1 and Factor 2 through three complementary lenses: distinguishing statements, one-sided priority statements, and consensus statements. Together, these results clarify where perspectives diverge, where one group places emphasis while the other

remains neutral, and where both groups recognise shared conditions in the governance of scope change during the bouwteam phase.

The analysis focuses on the statements that are both salient in the factor arrays and statistically significant in their loadings. This ensures that only the most meaningful contrasts and agreements are presented, avoiding noise from statements that are either weakly loaded or of low perceived importance to respondents.

6.3.1. Distinguishing Statements

Distinguishing statements are those for which Factor 1 and Factor 2 differ most strongly in their prioritisation. These statements reveal the core interpretive differences between the two perspectives. They indicate where respondents fundamentally disagree about how scope changes were handled, how responsibilities were enacted, and how formal or informal the process was perceived to be.

Table 6.3: Distinguishing Statements Between Factor 1 and Factor 2

F1	F2	Diff.	No.	Statement
4	-2	6	3	It was clear who had the authority to make final decisions on proposed scope changes.
3	-2	5	17	Every approved scope change was systematically implemented into the relevant c documents.
-3	2	5	27	The execution of scope changes originating from the bouwteam often begins before they are formally approved, making them difficult to trace after handover.
-2	3	5	2	Scope change discussions often mixed technical, financial and planning issues, making it unclear what the decision was really about.
1	-3	4	5	The decision-making arrangements set at the start of the bouwteam were consistently followed during the process.
-3	1	4	4	Decisions about scope changes were often made by whoever happened to be most involved, rather than by the formally responsible party.

These differences highlight the structural contrast between the perspectives. Factor 1 consistently recognises clear authority, systematic documentation, and formal decision-making, while Factor 2 experiences ambiguity, premature execution of changes, unclear discussions, and a lack of procedural structure. These distinctions define the central tension between a well-controlled governance process and a more vulnerable, informal practice setting.

6.3.2. One-Sided Priority Statements

One-sided priority statements are those that one factor considers important while the other is neutral. They offer insight into which issues are particularly relevant to one perspective, even if they do not generate controversy across the full respondent group.

Table 6.4: Statements with One-Sided Priority (Strong View in One Factor, Neutral in the Other)

F1	F2	No.	Statement
-4	0	13	It was often unclear who raised a change, when, and why.
-4	0	24	In the realisation phase, formal lines of authority leave limited space for the open consultation characteristic of the bouwteam.
4	0	36	Setting clear moments to freeze the design would help structure the transition to realization.
0	-4	9	The collaborative scope change process was documented, including causes and consequences.
0	-3	14	Change proposals were reviewed early to avoid uncontrolled development and duplicate assessment work.

These results show that Factor 1 attributes much stronger importance to clarity of initiation, the continuous space for open consultation across phases and the value of structured design freeze moments, whereas Factor 2 places priority on the lack of documentation and insufficient early review. Such asymmetries help identify improvement opportunities that matter to specific roles or contexts, even if they do not reflect full disagreement between perspectives.

6.3.3. Consensus Statements

Consensus statements express areas where both factors agree, either positively or negatively. These represent shared experiences across diverse stakeholders and therefore form essential foundations for the later formulation of the program of requirements.

Table 6.5: Consensus Statements Between Factor 1 and Factor 2

F1	F2	No.	Statement
-1	-4	11	Scope changes followed a structured sequence: initiation, evaluation, assessment, decision, and implementation.
2	4	37	Effective scope change tools depend more on behavioural discipline and ownership than on new software.

The consensus statements reveal two common insights. First, respondents broadly recognise that scope change procedures lacked a consistent sequence, signalling a systemic absence of formal process guidance. Second, behavioural discipline is regarded as more decisive for effective governance than the introduction of new digital tools. This recurring theme appears across interviews, cases, and factor arrays, underscoring its foundational importance for the framework development in later chapters.

6.4. Case–Stakeholder–Role Mapping

This section examines how the two identified perspectives are distributed across professional roles, project cases, and stakeholder groups. The purpose is not to generalise beyond the studied projects, but to clarify which contextual dimensions most strongly align with the perspectives represented by Factor 1 and Factor 2. Only significantly loading Q-sorts ($p < 0.01$) are considered, as these respondents most clearly characterise each factor. Across the mappings, role emerges as the dominant differentiating dimension, while case-specific patterns provide contextual variation and stakeholder affiliation does not appear to be explanatory.

6.4.1. Distribution by Role

The clearest and most consistent pattern is observed across professional roles. As shown in Table 6.6, project managers load exclusively on Factor 1, indicating a uniform alignment with the perspective of pragmatic confidence in informal governance. In contrast, contract managers and technical managers load predominantly on Factor 2, reflecting a more critical experience of informality, weak procedural anchoring, and insufficient documentation. This role-based split suggests that perspectives on scope change governance are closely related to differences in role-related responsibility, time horizon, and exposure to contractual and technical consequences rather than to individual or organisational preferences.

Table 6.6: Distribution of Significantly Loading Q-sorts by Role

Role	F1	F2	Total	% F1	% F2
Project Manager (PM)	6	0	6	100%	0%
Contract Manager (CM)	1	3	4	25%	75%
Technical Manager (TM)	0	1	1	0%	100%
Manager Project Controller (MPC)	0	0	0	–	–

6.4.2. Distribution by Case

The distribution across cases, presented in Table 6.7, shows meaningful variation but does not contradict the dominant role-based pattern. Case 2 aligns fully with Factor 1 and represents a project context in which respondents consistently experienced scope change governance as functioning adequately. Case 4 aligns entirely with Factor 2, reflecting a context where informality was widely perceived as weakly governed and problematic. Cases 1 and 3 show mixed distributions, indicating that different roles within the same project can experience the same governance environment in fundamentally different ways. These results suggest that case characteristics influence how role-based perspectives manifest, rather than determining the perspectives themselves.

Table 6.7: Distribution of Significantly Loading Q-sorts by Case

Case	F1	F2	Total	% F1	% F2	Summary
1	2	2	4	50%	50%	Mixed perspectives across stakeholders and roles.
2	3	0	3	100%	0%	Strong consensus aligned with Factor 1.
3	2	1	3	67%	33%	Mainly Factor 1, but internal division within the client team.
4	0	3	3	0%	100%	Strong consensus aligned with Factor 2.

6.4.3. Distribution by Stakeholder

In contrast to the clear role-based pattern, the distribution by stakeholder group shows no systematic division between client and contractor organisations. As shown in Table 6.8, both stakeholder groups are represented in similar proportions across Factor 1 and Factor 2. This indicates that the observed differences in perspective are not driven by organisational position or opposing client–contractor interests, but by the nature of the role performed within the bouwteam and the associated responsibilities.

Table 6.8: Distribution of Significantly Loading Q-sorts by Stakeholder

Stakeholder	F1	F1	% F1	F2 (sig.)	F2 (non-sig.)	% F2
Client	5	0	56%	3	1	44%
Contractor	2	1	60%	1	1	40%
Total	7	1	57%	4	2	43%

Taken together, these mappings show that differences between the two perspectives are primarily associated with role-based positions within the bouwteam. Case-specific conditions shape how these perspectives are expressed in practice, while stakeholder affiliation does not provide an explanatory distinction. This role-centred pattern forms a key empirical foundation for the synthesis chapter, where the implications of these differing perspectives for scope transfer and governance across the bouwteam–realisation transition are further analysed.

Synthesis

The Q-method analysis reveals two distinct perspectives on how scope changes are governed in bouwteam practice. These perspectives reflect different evaluations of a predominantly informal governance environment. Both perspectives assess the same practices, yet do so through role-specific lenses shaped by time pressure, responsibility, and exposure to future risk.

The first perspective, predominantly associated with project managers, values informal decision-making as an efficient and functional mode of governance. Informality is perceived as enabling rapid coordination, integrated problem-solving, and progress under tight schedules, without generating unacceptable risks for project delivery. From this viewpoint, formalisation is applied pragmatically and selectively, only when it adds immediate value. This logic aligns with governance modes suited to uncertainty, in which flexibility and relational coordination take precedence over procedural completeness (Turner & Keegan, 2001). It also reflects Galbraith's information-processing perspective, according to which decision-making authority gravitates toward those closest to the information in order to reduce information-processing demands in complex and ambiguous environments (Galbraith, 1974). Within such settings, sensemaking occurs through interaction rather than documentation, allowing teams to act despite incomplete information.

The second perspective, held exclusively by contract managers and technical managers, also recognises the necessity of informal interaction in bouwteams but emphasises its vulnerabilities. Informal decision-making is experienced as difficult to document and prone to ambiguity regarding mandate, timing, and rationale. As a result, decisions taken informally may become problematic when responsibility shifts and earlier choices must be interpreted retrospectively. This perspective corresponds to a governance-for-delivery orientation, in which formalisation, documentation, and procedural clarity are considered essential to support contractual robustness and the transferability of decisions to subsequent project phases (Turner & Keegan, 2001). From this viewpoint, informality is not rejected, but its consequences are assessed against future contractual and organisational requirements.

Both perspectives are rational given the roles and time horizons of the actors involved. Project managers operate under immediate delivery pressure and evaluate governance primarily in terms of short-term functionality and momentum. Contract and technical managers, by contrast, adopt a longer-term perspective focused on design responsibility, liability exposure, and contractual interpretation. These differences stem from role-based responsibilities rather than from fundamentally different values or professional competence.

From this comparison, a central observation follows: scope change governance in bouwteams is predominantly informal, while the transition to realisation carries formal contractual consequences. This condition is interpreted differently across roles, but not incorrectly by either.

The resulting tension is therefore not a flaw to be eliminated, but a structural feature of collaborative projects that must be explicitly recognised and governed.

Across the studied cases, this underlying tension manifests in a recurring set of governance symptoms. Scope-related decisions are frequently shaped through informal interaction rather than explicit procedures; mandate boundaries become blurred as authority shifts toward those most involved in the issue; documentation lags behind decision-making, creating traceability gaps; execution may begin

while decisions are still provisional; and multidisciplinary discussions sometimes obscure what has actually been decided. These symptoms do not occur uniformly, nor do they necessarily block progress during the bouwteam phase. However, they recur across roles and cases as different expressions of the same structural condition that informal coordination operates alongside, and sometimes ahead of, formal governance expectations.

To unpack how these perspectives diverge in practice, this chapter examines the statements on which they differ most strongly. As shown in the Q-method results (6.3.1), these differences concentrate on mandate clarity, the systematic implementation of decisions in bouwteam documentation, execution prior to formal approval, and the clarity of scope-related discussions. The sections below treat these themes as recurring manifestations of the broader tension between informal coordination and formal governance expectations, and use them to link the empirical findings to theory, contractual implications, and design principles for governance. The chapter concludes by examining the statements on which both perspectives converge, interpreting this area of consensus in light of the research objectives and identifying the shared intervention space that follows from it.

Mandate Clarity

The sharpest divergence between the two perspectives concerns mandate clarity. Respondents aligned with Factor 1 strongly agree that authority over scope decisions was clear (S3: +4), reject the idea that decisions were taken by whoever happened to be most involved (S4: -3), and generally perceive the initial decision-making arrangements as being followed in practice (S5: +1). Factor 2 respondents report the opposite pattern, contesting mandate clarity (S3: -2), recognising informal decision-making drifting toward the most involved actors (S4: +1), and denying that agreed arrangements were consistently adhered to (S5: -3). Validation interviews illustrate this contrast: project managers in Cases 1 and 3 describe decision-making as effectively clear and workable in practice, while technical and discipline leads describe blurred responsibilities, circular discussions, and diluted ownership when multiple specialists held partial authority and no single role felt empowered to conclude discussions.

This divergence can be explained by the distinction between formal and real authority. Even when decision rights are formally defined, effective authority tends to concentrate with those who control critical information and are most closely involved in day-to-day problem solving (Aghion & Tirole, 1997). In bouwteam settings, where scope issues are inherently cross-disciplinary and information is distributed, decision-making gravitates toward technical experts rather than formally designated decision-makers. This dynamic is reinforced by loose coupling between formal governance structures and operational practice (Orton et al., 1990) and by institutional decoupling, whereby formal arrangements exist but are only weakly enacted in practice (Meyer & Rowan, 1977). Mandate clarity therefore exists formally, but becomes unstable in practice.

The relevance of mandate ambiguity becomes visible at the transition to execution, but not because accountability is absent at handover. Validation interviews indicate that bouwteam decisions are typically collectively reviewed and formally endorsed prior to handover, creating in practice a shared sense of closure and collective responsibility. Practitioners therefore generally experience mandate arrangements as sufficiently clear to proceed into the execution phase.

This practical experience, however, does not fully align with the contractual logic governing responsibility and liability. Under DG2020, individual participants retain legally enforceable duties of care aligned with the advisory liability regime of DNR 2011 (§11.2), meaning that errors or omissions attributable to specific actors during the bouwteam phase may still give rise to liability, even where decisions were collectively endorsed. From a contractual perspective, mandate ambiguity thus remains relevant, not because responsibility is unclear at handover, but because it may be difficult to reconstruct where, when, and by whom scope-related commitments effectively emerged.

The core issue is therefore not responsibility allocation as such, but limited visibility of the decision-forming process. Project managers tend to experience decision-making as centrally coordinated, while technical and discipline leads observe that scope-defining choices often crystallise incrementally through specialist interaction. These commitments may not be recognised as decisions at the moment they begin to constrain future options. The divergence between perspectives is thus not one of responsibility, but of awareness.

Design principle. Governance should preserve informal coordination, but explicitly recognise when a scope-related issue moves from exploration to commitment. While alignment may occur informally across roles and levels, governance should make visible when technical choices narrow alternatives and begin to structure subsequent work. Focusing on recognising this moment—rather than formalising outcomes or shifting authority—supports collaboration while clarifying when decisions start to matter beyond the immediate interaction.

Systematic Embedding of Scope Decisions

A second point of divergence concerns whether approved scope decisions are systematically embedded in bouwteam documentation. Statement 17 (“Every approved scope change was systematically implemented into the relevant bouwteam documents”) is endorsed by Factor 1 (+3) and rejected by Factor 2 (−2). Factor 1 respondents perceive documentation as sufficiently complete, even when decisions are shaped informally and written down later. Project managers in Cases 1 and 3 describe decision-making as occurring primarily through technical discussions, with documentation following retrospectively once substantive agreement had been reached. Factor 2 respondents interpret the same practice as problematic. Contract and technical managers report that documentation was often incomplete precisely when decisions crystallised, resulting in later uncertainty about the rationale and implications of earlier choices. Case 2 stands out as an exception, where informal decision-making was combined with strong mutual discipline to ensure agreements were consistently recorded.

This pattern can be explained through the decoupling of formal documentation requirements from everyday decision-making under uncertainty (Meyer & Rowan, 1977). Under conditions of complexity and time pressure, bureaucratic control mechanisms such as systematic documentation are less effective as behavioural control instruments, because outcomes are difficult to specify and measure in advance (Ouchi, 1979). Teams therefore rely more heavily on relational or clan-based control, prioritising shared understanding over formal recording. While this supports progress and sensemaking, empirical research shows that insufficient documentation undermines predictability and increases exposure to claims and disputes in later phases (Ibbs et al., 2007; Love et al., 2011).

At the transition to execution, this decoupling becomes consequential. Execution contracts assess scope through formally documented and evidentially robust records, not through retrospective reconstruction of informal understanding. When scope decisions have not been systematically embedded in authoritative documents during the bouwteam phase, their status becomes ambiguous after handover, increasing the likelihood of reinterpretation, dispute, or exclusion from the binding scope definition.

Design principle. Governance arrangements should ensure that each approved scope decision is embedded in a minimal but authoritative documentary record when commitment is reached. Documentation should not attempt to capture informal deliberation, but must reliably record the decision, its rationale, and its implications in a form that remains transferable across the transition to execution.

Execution Prior to Formal Approval

A third point of divergence concerns the timing of execution relative to formal approval. Statement 27 (“The execution of scope changes originating from the bouwteam often begins before they are formally approved, making them difficult to trace after handover”) is rejected by Factor 1 (−3) and endorsed by Factor 2 (+2). Respondents aligned with Factor 1 do not recognise early execution as a structural issue. This perspective is illustrated by the client-side project manager in Case 3, who described scope changes as being handled transparently and proportionately: minor changes could proceed before formal approval when risks were negligible, while major changes followed formal channels. From this viewpoint, early execution is seen as a pragmatic and controlled exception that does not threaten traceability. Factor 2 respondents, by contrast, interpret early execution as a significant governance risk, particularly when changes are still under discussion or insufficiently formalised.

This divergence can be explained by differences in information access and risk perception across roles. Project managers typically operate with aggregated information and are primarily oriented toward maintaining momentum, evaluating early execution in terms of immediate feasibility and perceived technical risk. Contract and technical managers, by contrast, work closer to design detail and contractual implications and are therefore more likely to observe that execution may begin while

decisions are still provisional or contested. Consistent with information-processing theory, authority in such situations gravitates toward those closest to the information and action, rather than those holding formal approval rights (Aghion & Tirole, 1997; Galbraith, 1974). When physical execution precedes formal approval, informal alignment is converted into de facto commitment: once work is realised, reversal becomes increasingly unlikely. Informality thus shifts from a coordination mechanism into a source of irreversibility, reinforced by the decoupling between formal decision structures and operational practice (Meyer & Rowan, 1977; Orton et al., 1990).

The relevance of this pattern becomes acute at the transition to execution, particularly under UAV-GC. While DG2020 tolerates informal progression during the bouwteam phase, execution under UAV-GC assigns design and execution responsibility to the contractor, and liability follows factual performance rather than intended agreement. When scope changes are executed before formal approval, design choices are implicitly fixed without a clear approval trail, increasing exposure if subsequent changes, errors, or conflicting requirements emerge. Compared to UAV 2012—where execution is typically based on a completed specification—UAV-GC amplifies the risks associated with premature execution because design development and execution are contractually intertwined.

Design principle. Governance arrangements should explicitly distinguish between technical exploration, decision commitment, and physical execution. Informal preparation may proceed to support progress, but an explicit and minimal execution gate is required before execution begins. This execution gate marks the moment at which scope-related decisions are recognised as commitments, ensuring that direction-giving choices are acknowledged before they become irreversible in practice.

Clarity of Scope-Related Discussions

A fourth point of divergence concerns the clarity of scope-related discussions. Statement 2 (“Scope change discussions often mixed technical, financial and planning issues, making it unclear what the decision was really about”) is rejected by Factor 1 (–2) and strongly endorsed by Factor 2 (+3). Respondents aligned with Factor 1 do not experience this mixing as problematic; project managers describe integrated discussions as both inevitable and necessary to align interdependent technical, financial, and planning considerations. This is illustrated in Case 3, where the client-side project manager deliberately structured meetings to maintain overview while allowing flexibility, and reported that this prevented confusion even when scope changes emerged unexpectedly. Factor 2 respondents, however, experience the same discussion dynamics as undermining decision clarity. Discipline leads and technical managers in Cases 1 and 3 describe meetings in which multiple dimensions were addressed simultaneously without clear structuring, leading to diluted decision quality and uncertainty about what had actually been decided.

This divergence reflects different expectations regarding how decisions should be cognitively and procedurally organised. Project managers are accustomed to integrating multiple dimensions and maintaining an overarching view; for them, convergence emerges through interaction. Contract and technical managers, by contrast, rely more heavily on analytical separation to ensure that technical validity, cost implications, and planning consequences are each explicitly addressed and closed. When these dimensions collapse into a single conversational space, strong dialogue can create what may be described as an illusion of alignment: participants experience productive interaction, yet leave with different interpretations of what was agreed. The issue is therefore not communication quality, but the absence of explicit consolidation moments that translate discussion into shared decision meaning.

The relevance of this pattern becomes visible after handover. Execution-phase governance relies on the ability to interpret earlier decisions in terms of scope, responsibility, and justification. When discussions are not analytically disentangled, it becomes unclear which considerations informed which decision, complicating later interpretation and increasing the risk of inconsistent expectations across disciplines. What appears as flexibility during the bouwteam phase may thus translate into ambiguity when decisions must be defended, implemented, or reinterpreted under more formal contractual conditions.

Design principle. Governance arrangements should preserve integrated discussion while requiring explicit decision articulation. Scope-related discussions may span technical, financial, and planning dimensions, but outcomes must be consolidated into clearly framed decisions that specify what was decided, on which dimension, and with which implications.

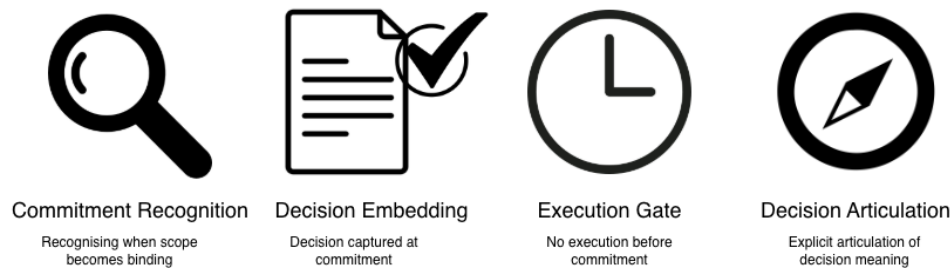


Figure 7.1: Overview of the four design principles derived from the synthesis, essential for governing informal scope change practices across the transition from bouwteam to execution

Consensus and Intervention Space

Beyond the points of divergence, the factor analysis reveals a clear and analytically relevant area of consensus. Both perspectives indicate that scope change processes are rarely structured or consistently documented in practice (S9, S11, S14), while at the same time recognising the value of clear consolidation moments, such as explicit design freezes, to support transition to realisation (S36). Both also emphasise that effective governance depends primarily on behavioural discipline and ownership rather than on additional tools or software (S37). This suggests that the core issue is not a lack of awareness or intent, but the absence of simple mechanisms that help translate shared intentions into consistent practice under time pressure.

This reframes the governance challenge. Actors broadly agree on what “better” scope change governance would look like—clearer consolidation, explicit commitment moments, and disciplined follow-up—yet these qualities do not reliably emerge in the uncertain and iterative setting of bouwteam collaboration. The gap does not stem from resistance to structure or from conflicting values across roles. Instead, it reflects the lack of lightweight arrangements that support clarity without disrupting the informal coordination that teams consider essential.

The intervention space therefore lies not in eliminating the tension between informality and formality, but in governing it more deliberately. Improvements should focus on recognising when discussions become commitments, clarifying what has been decided, and ensuring that such decisions can be understood and relied upon beyond the immediate meeting context. As shown in Figure 7.2, the tension between informal coordination and formal governance expectations creates recurring vulnerabilities that define this shared intervention space. Building on the four design principles—commitment recognition, decision embedding, execution gates, and decision articulation—the framework presented in the next chapter translates these principles into a coherent and proportionate governance approach for bouwteam practice.

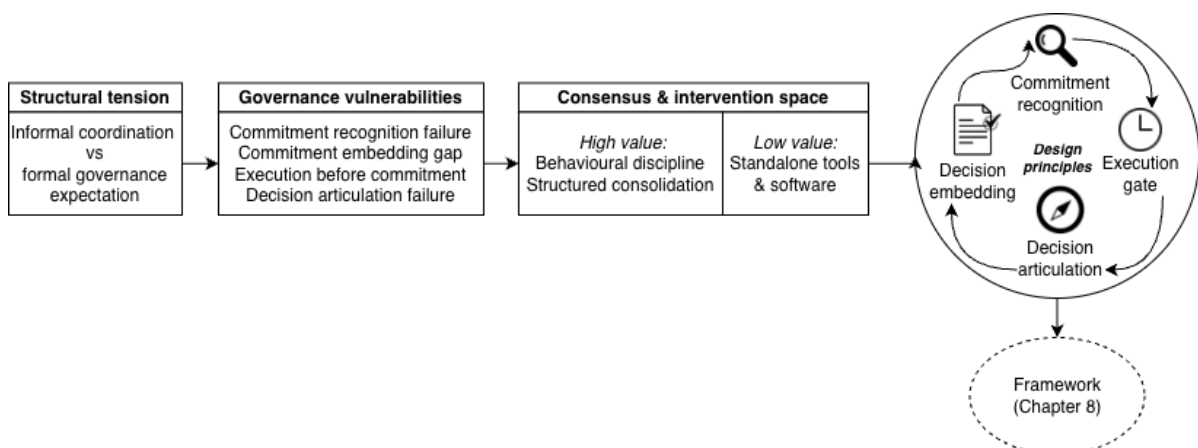


Figure 7.2: From structural tension to mutually reinforcing design principles.

Proportionate Formality: A Governance Framework

Building on the synthesis presented in the preceding chapter, this chapter introduces a governance framework aimed at structuring how scope-related decision-making is articulated within bouwteam projects. The synthesis demonstrated that the coexistence of informal coordination and formal governance expectation constitutes a structural and functional tension rather than a deficiency in bouwteam practice. Informality enables flexibility, speed, and integrative problem-solving, while formalisation becomes necessary when decisions acquire effects beyond their original context.

This chapter does not seek to resolve this tension or replace informal working practices. Instead, it introduces a framework that makes the consequences of informal, direction-giving points explicit and provides a proportional mechanism for determining when and how such points should be formalised. The framework is grounded in the design principles derived from the synthesis and translates these principles into a governance logic that supports disciplined decision articulation without undermining the collaborative character of bouwteams.

The sections that follow position the framework conceptually, outline the design principles on which it is based, and explain its structure and internal logic. Subsequently, the chapter addresses how the framework is intended to be governed in practice, including the allocation of ownership and the manner in which it is applied within the bouwteam context.

8.1. Purpose and Positioning of the Framework

The purpose of the framework is to provide a governance mechanism for determining when informal, scope-related points require explicit articulation within bouwteam projects. It responds to a structural tension identified in the synthesis: the value of informal coordination versus the expectation of formal governance. While this tension rarely disrupts daily collaboration, it produces effects when direction-giving points are articulated too late, too inconsistently, or with disproportionate formality. These effects become visible in limited scalability of decisions, loss of contextual understanding, and difficulties in transferring scope-related points across project phases.

Points that function effectively within the collaborative setting of the bouwteam may later be relied upon as stable references once the project enters the execution phase under UAV or UAV-GC conditions. In that environment, earlier points are interpreted within a contractual logic that demands clarity and stability. The framework anticipates this shift by supporting timely articulation before such reliance occurs, without turning exploratory interaction into premature legal fixation.

Rather than judging the substantive importance of discussions, the framework focuses on their governance effects. It does not treat all discussions as decisions, nor assume that every direction-giving point must be formalised. Instead, it provides a structured way to recognise when informal alignment begins to shape subsequent work or meaningfully narrow alternatives. At that moment, it supports a deliberate judgement about whether explicit articulation is needed, and at what level.

A similar dynamic can be observed in everyday situations. Consider someone saying: *“Maybe we should*

go to Italy in July.” Initially, this is merely an idea. Yet once actions follow — checking prices, requesting leave, discussing plans — the remark begins to shape behaviour and reduce alternatives. Although nothing has been formally decided, the statement starts to structure subsequent choices. The relevant shift occurs not when the idea is expressed, but when it begins to influence downstream actions. The framework is designed to detect this type of transition: the moment an informal point acquires practical consequences that may warrant explicit articulation.

Although the synthesis revealed systematic differences in how project managers, technical managers, and contract managers value informal coordination and formal governance, the framework does not assign interpretive authority along these role-based lines. Instead, it translates these differences into shared assessment themes centred on observable effects. In doing so, it offers a neutral governance structure through which implicit tensions can be recognised and stabilised without privileging specific professional perspectives.

The framework is positioned as a governance intervention concerned with decision articulation and transfer, not with technical optimisation, contractual compliance, or process control. It is not a checklist or legal instrument, and it does not determine contractual validity or allocate responsibility. Rather, it operates alongside existing bouwteam practices and supports collective reflection at critical moments.

Central to this positioning is the concept of proportional formality. Formalisation is treated as a variable response to the effects a point may have within the broader decision chain, not as a default requirement. The framework seeks to prevent both under-articulation — where direction-giving points remain implicit — and over-articulation — where exploratory discussions are prematurely fixed. By matching the degree of articulation to the significance of a point, the framework supports minimal yet reliable consolidation of scope-related points and strengthens their transfer across project phases without undermining the informal nature of bouwteam practice.

8.2. Design Principles as Foundation

The governance framework presented in this chapter builds on four design principles identified in the synthesis of the empirical findings: commitment recognition, decision embedding, execution gate, and decision articulation. These principles capture the shared logic through which bouwteam actors manage scope-related decision-making in practice, even though this logic is rarely made explicit or systematically organised during the bouwteam phase.

Rather than representing isolated control mechanisms, the design principles function as an interdependent system. Each principle addresses a distinct aspect of how informal coordination acquires stability over time: recognising when informal alignment becomes a binding commitment, embedding such commitments in authoritative project records, distinguishing decision commitment from physical execution, and articulating what has been decided and on which dimensions. Their value lies not in individual application, but in their combined capacity to discipline decision-making without formalising it prematurely.

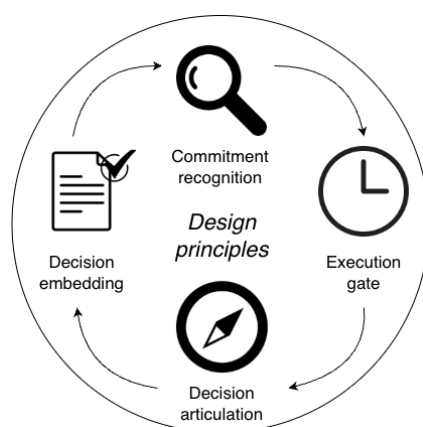


Figure 8.1: Interrelated design principles underpinning the governance framework

Figure 8.1 visualises this systemic relationship by presenting the four principles as an interrelated configuration. The figure highlights that effective governance in bouwteam settings does not rely on single intervention moments, but on the recurring interplay between recognising commitments, embedding decisions, gating execution, and articulating decision meaning. Taken together, these principles stabilise informal practice at the moments where its effects extend beyond the immediate interaction, without prescribing a fixed order or formal process.

The governance framework introduced in the following sections constitutes a concrete operationalisation of these design principles. Rather than introducing new rules or formal procedures, the framework translates the principles into a practical governance logic that supports proportionate formality. In doing so, it provides a structured way to recognise when informal coordination becomes direction-giving, how such moments should be consolidated and articulated, and how clarity, interpretability, and responsibility can be organised without undermining the collaborative dynamics that characterise bouwteam projects.

8.3. The Framework Explained

Figure 8.2 presents the governance framework in its operational form. The framework translates the previously derived design principles into a structured but lightweight governance logic. Rather than imposing new procedures, it introduces a sequence of reflective steps that help actors recognise when informal coordination begins to function as commitment. The framework distinguishes between the informal discussion space of the bouwteam, a trigger mechanism (Layer 1), a commitment classification step (Layer 2), and the subsequent embedding and distribution of recognised commitments.

Informal Discussion Space

All scope-related issues initially arise within the informal discussion space of the bouwteam. Meetings, workshops, and alignment moments provide the setting in which ideas are explored, alternatives are compared, and provisional preferences emerge. At this stage, contributions are not yet treated as decisions. They function as exploratory inputs within a collaborative process.

To increase awareness without prematurely formalising discussion, potentially direction-giving items can be captured in a running list during the meeting. This list functions only as a signalling device. It does not imply commitment, nor does it convert discussion into decision-making. At the end of the meeting, the list is briefly reviewed and refined: items may be added if overlooked, or removed if, upon reflection, they are unlikely to shape subsequent work. Once collectively approved, the remaining items proceed to Layer 1 – Trigger.

Layer 1 – Trigger

Layer 1 introduces a simple but decisive question:

Will this item be taken forward as an input or an assumption for work beyond this meeting?

The purpose of this question is not to assess the substantive quality, desirability, or technical correctness of the item. Instead, it asks whether the item begins to structure subsequent work. In other words, does the team intend to act upon it, rely on it, or treat it as a working basis in further design, planning, budgeting, or coordination activities?

For example, the project team discusses the possibility of shifting the alignment by two metres to avoid a land access issue with a private landowner. As long as this option is only explored and alternatives remain open, it stays part of the discussion. However, if drawings are modified, calculations are revised, or cost estimates are prepared on the assumption that the shift will take place, the item is no longer just an idea. It begins to guide further work and reduces the range of alternatives. At that point, it starts to structure subsequent decisions and actions.

If the answer to the trigger question is negative, the item remains within the informal discussion space to avoid unnecessary formalisation.

If the answer is positive, the item proceeds to Layer 2. This does not yet mean that the item is formalised or fixed. Rather, governance attention is activated. The team acknowledges that the item may be commitment-forming and therefore requires deliberate classification.

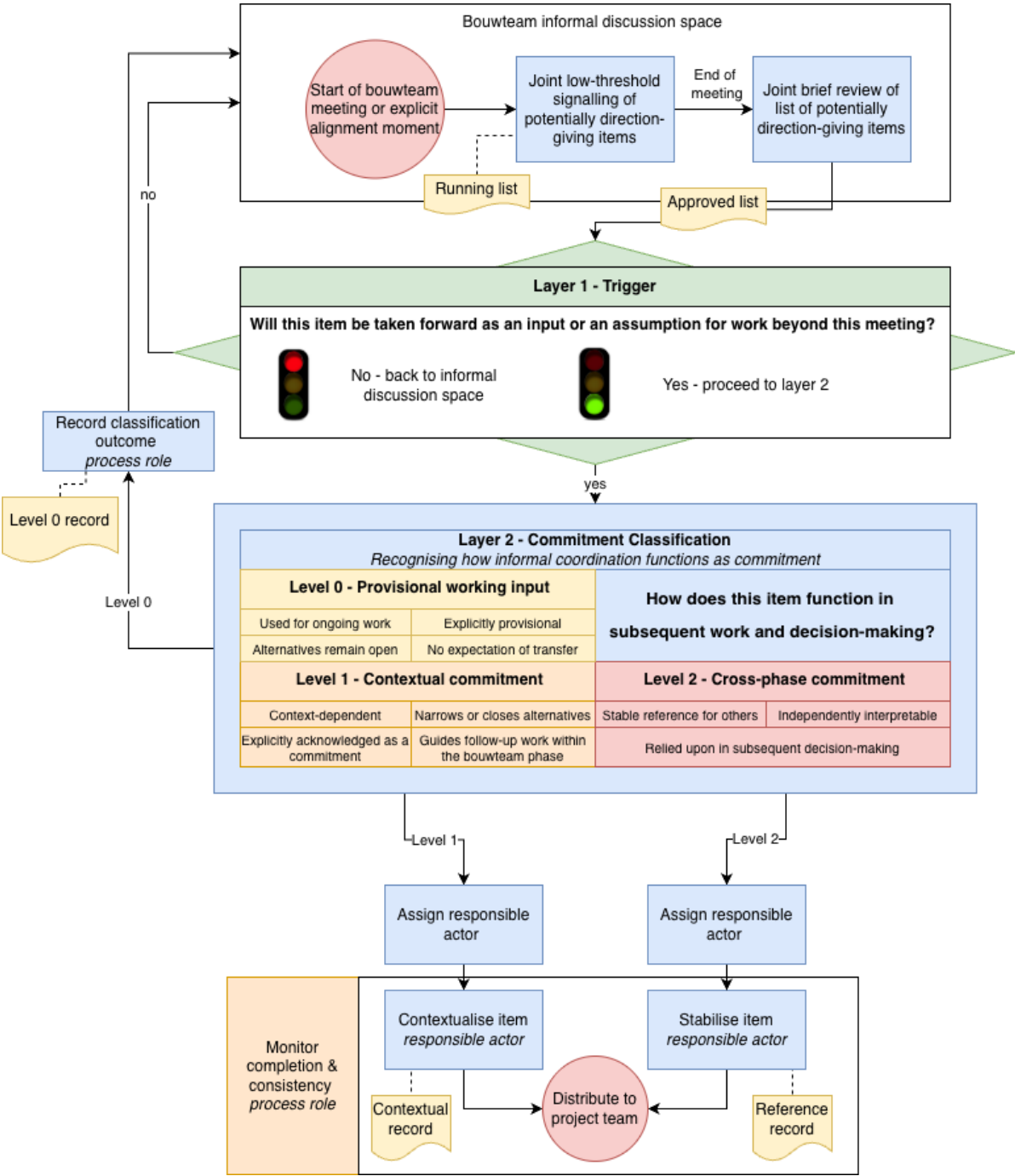


Figure 8.2: Proportionate formality framework

Layer 2 – Commitment Classification

The purpose of Layer 2 is recognising how informal coordination – triggered by Layer 1 as possible commitment-forming – functions as a commitment. The guiding question is:

How does this item function in subsequent work and decision-making?

The framework distinguishes between three levels.

At **Level 0**, the item is used as a provisional working input. It may guide ongoing tasks, but alternatives remain open and there is no expectation that the item will serve as a stable reference across roles or phases. If an item reaches Level 0 through Layer 2, the item is briefly noted in the Level 0-record.

At **Level 1**, the item functions as a contextual commitment within the bouwteam phase. It narrows or closes alternatives and is explicitly acknowledged as a commitment. Its meaning, however, remains dependent on the shared context in which it was developed. In this case, a contextual record is created to capture the decision and its rationale in a proportionate manner.

At **Level 2**, the item functions as a cross-phase commitment. It is likely to be relied upon beyond the immediate interaction in which it emerged, including during the transition to execution. Because it may serve as a stable reference for others, it must be independently interpretable. A reference record is therefore created to anchor the commitment in a transferable form.

Detailed specifications of the contextual and reference records are provided in Appendix G.

Documentation and Distribution

Once a commitment has been classified, it must be embedded in the project environment. For Level 1 commitments, a responsible actor is assigned to contextualise the item. For Level 2 commitments, a responsible actor is assigned to stabilise it.

Both types of records are subsequently distributed to the project team. In this way, commitments become not only documented but visible and accessible.

The consistent application of these steps requires explicit coordination. The framework therefore assumes that responsibility for monitoring, classification, and documentation is clearly assigned. The following section addresses how ownership application of the framework can be organised in practice.

8.4. Ownership and Application

For the framework to function effectively in practice, describing its logic is not sufficient. It must also be clear how it is introduced within the bouwteam, how it is applied in day-to-day coordination, and who carries responsibility for its consistent use.

This section distinguishes between *ownership* and *application*. Ownership concerns the behavioural and organisational conditions required for the framework to be taken seriously in practice, including who should guide its use and why. Application focuses on the practical dimension: when the framework is used, how intensively it is applied, what effort it requires, and which responsibilities are added to the designated coordination role.

8.4.1. Ownership

The Q-method results presented in Section 6.3.3 reveal an important starting point. Both perspectives agreed that scope change processes were not consistently structured in practice, and that effective governance depends more on behavioural discipline than on new tools or software. The framework therefore does not introduce a technical solution, but relies on consistent application by the project team.

This creates a practical challenge. While the framework may appear valuable from a governance or control perspective, its use requires discipline in already demanding project environments. Bouwteam members operate under time pressure, and additional administrative burdens are unlikely to be welcomed. For the framework to be accepted, its simplicity, proportionality and clear benefits in relation to the effort need to be explicitly explained at the start of the bouwteam.

Individual commitment alone, however, is insufficient. Without explicit role ownership, consistent application cannot be assumed. A specific role must therefore be assigned responsibility for initiating

the framework at the right moment, overseeing commitment classification, and ensuring that records are completed and distributed where required.

Without such ownership, three structural risks arise. First, direction-giving points may not be recognised in time, particularly when they develop gradually through specialist interaction. Second, classification may be applied inconsistently across meetings or disciplines. Third, documentation may remain fragmented, reducing clarity at the transition to execution.

Allocation of the Governance Coordination Role

The allocation of governance ownership is not self-evident. Two primary positions can be distinguished.

From a contractual perspective, assigning the role to the client's Manager Projectbeheersing (MPB) appears logical. DG2020 assigns the client responsibility for leading and coordinating the bouwteam (§5–§6) and establishes legally enforceable duties of care for participants aligned with the advisory liability regime of DNR 2011 (§11.2). Given this formal coordination responsibility, it can be argued that structured recognition of scope-related commitments falls within the client's governance domain.

However, a strong counterargument exists. Once the project transitions into execution under UAV or UAV-GC conditions, the contractor carries substantial execution risk. Even within DG2020, contractors retain legally binding advisory duties and may incur liability for professional errors attributable to their role. From an incentive perspective, the contractor therefore has a direct interest in ensuring that scope-related commitments are clearly recognised and proportionately embedded before execution reliance occurs.

The empirical findings further support this view. The synthesis showed that technical and contract managers — roles often positioned on the contractor side — expressed stronger concern regarding mandate clarity, decision embedding, and execution prior to commitment. This suggests that the contractor's MPB function is structurally well positioned to monitor when informal alignment begins to function as commitment.

On balance, this thesis proposes that the governance coordination role is most coherently positioned with the contractor's MPB function. This aligns governance attention with execution risk and strengthens the practical relevance of commitment recognition at the transition to realisation. Nevertheless, alternative allocations remain conceivable, and further empirical research could assess comparative effectiveness across organisational contexts.

8.4.2. Application

Application of the framework begins with transparency. At the start of the bouwteam phase, the project team must be informed that the framework will be used and why. As discussed in the previous subsection, consistent application depends on behavioural discipline. Team members must therefore understand that the benefits of applying the framework outweigh the limited additional effort it requires.

If the framework becomes structurally embedded within organisational practice, this introduction can be carried out by the governance coordinator. In projects where the framework is newly introduced, however, the client typically initiates its adoption. In that case, the client is responsible for explaining its purpose and clarifying expectations regarding use.

Effort and Benefits

Convincing the team requires clarity about both effort and benefits. The primary efforts are time-related and are largely concentrated in the governance coordination role. The benefits, by contrast, extend beyond the bouwteam phase and become visible particularly at the transition to execution. Table 8.1 summarises the main considerations.

Table 8.1: Indicative effort and benefits of framework application

Effort	Benefits
Additional responsibilities for the governance coordinator	Improved transferability of scope-related decisions
Approximately 15–30 minutes at the end of each bouwteam meeting for framework application	Reduced reinterpretation and friction during execution
Approx. 5 minutes per Level 1 or Level 2 item for contextualisation or stabilisation	Clearer cross-disciplinary alignment
Limited documentation effort for selected commitments	Lower risk of conflict and delay at contractual transition
	Potential reduction in execution time and costs

The time investment remains proportionate. In most meetings, only a limited number of items will move beyond Layer 1 and require commitment classification. Level 1 commitments involve limited contextual documentation, while Level 2 commitments are comparatively rare but governance-critical and therefore demand greater precision to ensure clear interpretation across phases.

Moments of Application and Responsibilities

Application of the framework follows a predictable rhythm throughout the bouwteam phase. Table 8.2 outlines the key moments and corresponding responsibilities of the governance coordinator.

Table 8.2: Responsibilities of the Governance Coordinator

Moment	Action
Start of the bouwteam (if structurally adopted)	Introduce the framework and transparently explain its purpose, effort, and benefits.
Start of each bouwteam meeting or alignment moment	Announce application of the framework and briefly explain the procedure (running list, trigger question, classification, documentation and distribution).
During the meeting	Maintain a running list of potentially direction-giving items without implying commitment.
End of the meeting	Review and finalise the running list with the team before applying Layer 1.
Layer 1 assessment	Ask the trigger question and coordinate classification of items. Record outcomes.
Layer 2 classification	Facilitate commitment verification, coordinate agreement on level (0, 1, or 2), and record the result.
Post-classification	Assign responsible individuals for contextualisation (Level 1) or stabilisation (Level 2).
After assigning	Monitor proper documentation and distribution of records.

The governance coordinator does not take substantive project decisions and does not alter formal decision-making authority as defined in the contract. Instead, the role safeguards visibility of when informal coordination begins to generate commitment effects.

By assigning explicit ownership while maintaining proportional intensity, the framework strengthens governance discipline without undermining the collaborative dynamics that characterise bouwteam practice.

Discussion

This chapter reflects on the implications and boundaries of the findings presented in the previous chapters. The discussion examines conceptual tensions, practical limitations, and the positioning of the proposed governance approach within its contractual and institutional context. It concludes by outlining the theoretical and practical contribution of the study.

Experienced Versus Contractual Exposure

The findings indicate that liability is not experienced as a dominant concern during the bouwteam phase. Both perspectives in the Q-analysis focus mainly on the practical consequences of informality—such as reinterpretation, scalability, and clarity—rather than on legal exposure. This does not necessarily reflect negligence or blind spots. Instead, it can be understood as a rational response to the fact that liability disputes rarely arise in everyday project practice. In most projects, collective approval at handover creates sufficient confidence to proceed into execution without perceiving unresolved exposure.

Under DG2020, however, participants remain subject to individual professional duties of care in line with the advisory liability regime of DNR 2011. Collective approval at handover does not eliminate the possibility that specific actors may later be held responsible for professional errors linked to their role. As illustrated by arbitral case law, liability questions may surface retrospectively when risks materialise during execution. The informal and distributed nature of bouwteam decision-making may complicate the allocation of responsibility, but it does not remove contractual exposure.

The framework does not address liability as such. It does not alter legal responsibility and does not function as a protective instrument against claims. Its relevance in this context is indirect: while it may improve clarity around how commitments emerge, it neither reallocates nor resolves contractual risk.

Transferability as an Independent Governance Value

Even in the absence of legal disputes, scope-related decisions must remain coherent as projects move from collaborative development to execution. When earlier choices are insufficiently articulated, teams may struggle to build consistently on prior agreements. This can lead to misalignment across disciplines, renewed discussion of settled assumptions, and loss of momentum.

The framework therefore addresses a governance challenge of continuity. By making visible when informal alignment begins to structure subsequent work, it supports more stable decision development across roles and phases. This value does not depend on the presence of legal conflict. Liability considerations may increase the urgency of clarity, but the governance benefit of improved transferability stands independently of contractual exposure.

Recognising Direction-Giving Commitments

A central conceptual element of the framework is the notion of “direction-giving” commitments. This category is not objectively measurable. It requires professional judgement and is sometimes clearer in retrospect than in the moment itself. Misclassification is therefore possible. Items may be treated as commitment too early, or recognised too late.

This interpretative element does not represent a flaw but reflects the nature of governance in complex project environments. Decision-making in bouwteams is iterative and distributed. The framework

does not attempt to eliminate judgement, but to make it explicit. Over time, repeated application may strengthen teams' shared understanding of when informal alignment begins to constrain alternatives and shape subsequent work. Governance, in this sense, evolves through disciplined practice rather than mechanical rules.

Proportionality as a Normative Governance Choice

The framework relies on proportionality as a guiding principle. Over-formalisation risks generating unnecessary administrative burden and excessive documentation that obscures rather than clarifies relevant commitments. Under-formalisation, by contrast, increases the likelihood of reinterpretation, contextual loss, and friction at contractual transition.

Proportionality cannot be reduced to a formula. It operates as a professional norm that must be exercised with discipline. The framework offers structure for this judgement, but it does not replace it. Its effectiveness depends on consistent yet restrained application. If governance intensity exceeds perceived benefit, adoption may weaken. Conversely, if the framework is applied too loosely, its value diminishes. Finding the right balance depends on the specific project context and the judgement of the professionals involved.

Process Ownership and Incentive Alignment

The allocation of governance ownership illustrates how institutional context shapes application. Positioning the coordination role with the client's MPB aligns with formal contractual responsibility under DG2020. Locating it with the contractor's MPB aligns governance attention with execution risk and incentive structures.

Neither allocation is inherently correct. Each influences how the framework is perceived and enacted. Client ownership may emphasise oversight and formal coordination, whereas contractor ownership may emphasise risk management and execution preparedness. The choice therefore represents a strategic governance decision rather than a purely technical one, and may vary depending on project characteristics and organisational culture.

Contextual Embeddedness of Bouwteam Governance

The framework was developed within the context of Dutch DG2020-based bouwteams, where relational collaboration and informal coordination are institutionalised features rather than deviations from formal order. Its logic assumes a setting in which trust and iterative alignment are central to project delivery.

In more adversarial or heavily formalised contractual environments, the dynamics of informal coordination may differ substantially. The applicability of proportionate formality beyond the DG2020 context therefore remains an open question. Further research would be required to assess how the framework performs under alternative governance regimes.

Methodological Reflections

The original focus of this study was on the formal scope change process in bouwteam projects and the extent to which it is applied in practice. During analysis, however, it became clear that scope-related decisions rarely follow a clearly defined formal sequence. Instead, they emerge gradually through informal interaction. This observation led to a shift in the research lens: from assessing compliance with formal procedures to examining how informal decision formation functions and how it affects execution. This reframing influenced both the research questions and the interpretation of the findings, aligning the study more closely with observed practice than with predefined procedural expectations.

The empirical basis of the study consists of fourteen respondents across four DG2020-based bouwteam projects. Q-methodology enables the identification of shared perspectives within relatively small samples, but it does not support statistical generalisation. The factors therefore represent structured subjectivities rather than measurable behavioural frequencies. The findings should be understood as analytically derived patterns of meaning across perspectives, not as representative claims about the prevalence of specific practices.

Both the interpretation of the factors and the development of the governance framework involve researcher judgement. The factors are not automatic products of statistical rotation; they are constructed through the integration of Q-results, contractual analysis, literature, and validation interviews. The

framework translates these interpretative insights into a governance proposal, but it has not been empirically tested as an intervention model.

Finally, the framework has been subject to limited expert validation and has not been tested longitudinally in live project settings. Although expert feedback supported its conceptual clarity and practical relevance, its behavioural impact and operational robustness under real project pressure remain unexamined. The effectiveness of the framework in practice, including its proportional application and sustained adoption, therefore requires further empirical study. Future research could include iterative expert validation, field implementation, and longitudinal evaluation to assess how the framework performs across different organisational and contractual contexts.

Theoretical and Practical Contribution

Theoretically, this study contributes to bouwteam governance literature by articulating how differing role-based perspectives shape the interpretation of informal decision-making. It shifts analytical focus from procedural design to the moment at which informal alignment becomes direction-giving. Governance is framed not as additional control, but as calibrated recognition.

Practically, the framework offers a structured yet lightweight mechanism to support proportionate articulation of scope-related commitments. It does not replace contractual management or eliminate uncertainty. Instead, it strengthens awareness of when informal coordination begins to acquire consequences beyond the immediate interaction, thereby supporting continuity across project phases.

Conclusion & Recommendations

10.1. Conclusion

This study examined how scope-related decisions take shape during the bouwteam phase, how they acquire practical significance at the transition to the realisation phase under UAV(-GC), and how this process can be governed to improve clarity, traceability, and transferability. The findings show that scope-related decisions in bouwteams primarily emerge within a collaborative environment characterised by uncertainty, interdependence, and overlapping responsibilities. During the bouwteam phase, decisions often function effectively within the group that made them, even when they remain informal or only partially documented. Their vulnerability only becomes visible once they are required to operate beyond this original context, particularly at the moment of contractual transition. At that point, the reliability of scope-related decisions depends less on whether their technical content is contested, and more on whether others can clearly understand and apply them outside the setting in which they were originally agreed.

With respect to the formation of scope-related decisions during the bouwteam phase, the study shows that such decisions are rarely the outcome of discrete or formally bounded moments. Instead, scope-related issues are raised, discussed, and gradually shaped into decisions through ongoing interaction in bouwteam meetings and coordination processes. This informality is not incidental, but inherent to the bouwteam context, where many design, scope, and risk-related questions are still open and require joint exploration. Although roles and responsibilities are formally defined, their practical execution overlaps, and decisions emerge through collective alignment rather than through linear or hierarchical procedures. As a result, participants generally recognise that decisions are being made, even when these decisions are not explicitly labelled or formally closed at the moment they arise.

The study further shows that the documentation of scope-related decisions during the bouwteam phase is widely experienced as insufficiently structured. Empirical results indicate that decisions are not consistently documented in a stepwise or systematic manner, and that records often capture outcomes without fully consolidating the considerations, alternatives, or conditions that informed those outcomes. Project managers tend to assess this level of documentation as adequate for maintaining momentum and coordination during the bouwteam phase. In contrast, contract managers and technical managers experience the same documentation practices as creating uncertainty about what exactly has been decided and under which conditions, especially because they anticipate that these records will later be relied upon. The broad consensus among participants that clearer moments of more structured consolidation would improve decision control indicates that scope-related decision documentation is currently not perceived as sufficiently robust, particularly in terms of traceability — understood here in a governance sense as the ability to reconstruct and interpret decisions across phases, rather than in a strictly legal sense.

Actor roles and procedural arrangements play a decisive role in shaping how scope-related decisions are formed, valued, and recorded. The DG2020-based bouwteam context supports flexible and advisory interaction, allowing decisions to remain informal until they are incorporated into execution-oriented documents. Within this setting, project managers typically prioritise progress, flexibility, and timely alignment, while contract managers and technical managers place greater emphasis on precision, completeness, and future interpretability. These differences reflect the fact that roles carry different

responsibilities and therefore prioritise different risks and time horizons. Importantly, this role-based tension does not undermine collaboration; instead, it contributes to balancing speed and thoroughness. However, because there are no explicit governance mechanisms to manage this tension, the moment at which informal alignment should be treated as a commitment often remains implicit, resulting in inconsistent recording and consolidation practices.

When projects transition from the bouwteam phase to the realisation phase under UAV or UAV-GC, scope-related decisions are interpreted within a fundamentally different institutional environment. Decisions made during the bouwteam phase are assessed on the basis of their formal incorporation into contractual and execution documents, as only those elements acquire binding status in the realisation phase. Where earlier decisions have been clearly consolidated, they provide a workable basis for continuation. However, where decisions are incomplete, ambiguously recorded, or insufficiently contextualised, teams may struggle to continue work with confidence, which can lead to delay, duplication, or renewed discussion.

The study also shows that the shift in contractual roles and liability at the transition to the realisation phase is not experienced by participants as a dominant source of concern. Decisions made during the bouwteam phase are generally understood as collectively approved before handover, which creates confidence in their legitimacy. However, the absence of perceived liability does not mean that liability is absent in contractual terms. Under DG2020 and the advisory liability regime of DNR 2011, individual professional duties of care remain in force, and specific actors may still be held responsible for errors attributable to their role if problems arise during execution. The difficulty of reconstructing how certain decisions emerged — the so-called “black box” of the bouwteam — does not eliminate this exposure. It only complicates later assessment. In practice, the main vulnerability is therefore not active liability disputes, but the limited transferability of decisions whose scope, assumptions, or implications were not sufficiently clarified at the time they became direction-setting.

Taken together, these findings point to a governance challenge that does not lie in informal decision-making as such, but in recognising when informal alignment becomes direction-setting for scope, cost, or risk. Governance arrangements that support robust scope-related decision-making must therefore focus on identifying the moment at which discussion turns into commitment and ensuring that such commitments are proportionately classified and consolidated. Rather than increasing formalisation across all interactions, effective governance requires conscious commitment recognition and selective documentation at the right moments. The governance framework developed in this study responds to this need by supporting teams in identifying when informal agreements begin to structure subsequent work and by guiding the appropriate level of consolidation, while preserving the flexibility that characterises the bouwteam context.

In answering the main research question, this study demonstrates that scope-related decisions in bouwteam projects take shape through collaborative and often informal interaction, acquire practical significance when they must operate across contractual boundaries, and require governance attention at the moment they become direction-giving beyond their original discussion context. The interpretation of such decisions at the transition to the realisation phase is not primarily driven by technical disagreement and only in part influenced by liability considerations, but largely by whether earlier commitments can be clearly understood, trusted, and applied by actors operating under different roles and contractual regimes. Improving clarity, traceability, and transferability therefore requires governance arrangements that explicitly recognise this shift and support the timely identification and consolidation of commitments. In this way, the study shows that the core governance issue in bouwteam projects lies in managing the transformation of informal alignment into reliable cross-phase commitments, shaped by role-based perspectives and contractual context. Governance, in this sense, is not primarily about adding control, but about the calibrated recognition and articulation of moments at which informal coordination begins to carry durable consequences beyond the collaborative setting.

10.2. Recommendations

This section translates the conclusions of the study into concrete recommendations. The recommendations address three related domains: the governance of scope-related decision-making in bouwteam projects, the practical application of the governance framework developed in this thesis, and directions for future research. Together, they aim to strengthen how scope-related decisions are handled across project phases, without prescribing rigid or context-specific solutions.

Governance of Scope-related Decision-making in Bouwteams

Governance arrangements in bouwteam projects should explicitly recognise that different roles view informal decision-making differently. Project managers often prioritise progress and flexibility, while contract and technical managers place greater emphasis on clarity and future reliability. These differences follow logically from their respective responsibilities and time horizons. Recognising this productive tension as a structural feature of bouwteam collaboration is a precondition for effective governance.

Rather than judging decision quality primarily by the level of formalisation, governance should focus on whether decisions can continue to function once the project moves into execution under a different contractual regime. This means that attention should not be limited to the moment of transition itself, but should already be present during the bouwteam phase, with awareness that informal alignment may later operate as commitment.

Projects should therefore consciously reflect on when informal agreements begin to guide subsequent work, constrain alternatives, or shape cost, scope, or risk assumptions. The aim is not to formalise all interaction, but to ensure that direction-setting commitments are recognised and anchored in a way that allows them to remain understandable and usable beyond the original meeting context.

Application of the Governance Framework

The governance framework developed in this study should be applied as a supporting instrument for reflection and coordination, not as a compliance tool. Its purpose is to help teams recognise when an informal agreement begins to function as a commitment and to decide, in a proportionate manner, whether that commitment requires consolidation.

The framework is particularly relevant at alignment moments, such as the end of bouwteam meetings, where exploratory discussions may gradually solidify into direction-setting choices. At these moments, the framework supports a structured check: is this still exploration, or has it become something others will rely on? If the latter, the commitment should be explicitly classified and, where necessary, documented in a lightweight but consistent manner.

Although effective use of the framework requires explicit coordination ownership, its application depends on active engagement from each of the members of the project team. Used in this way, the framework does not replace existing documentation or contractual procedures, but complements them by strengthening awareness of when informal coordination acquires lasting consequences.

Future Research

Future research could investigate whether the role-based divergence in perspectives identified in this study occurs across a broader range of bouwteam projects and contractual settings. Expanding the empirical base would clarify to what extent these patterns are specific to DG2020-based projects or more generally characteristic of collaborative project environments.

In addition, observational or longitudinal research could provide deeper insight into how scope-related decisions evolve over time, particularly at the interface between informal alignment and execution reliance. Such studies could examine how direction-setting commitments are recognised in practice and how consistently proportional consolidation is applied under real project pressure.

Finally, the governance framework itself should be empirically tested in live projects. Iterative implementation, behavioural observation, and comparative evaluation across organisational contexts would enable assessment of its practical effectiveness and reveal potential refinements. Only through such application-based research can the robustness and sustained value of proportionate formality be established.

References

- Aghion, P., & Tirole, J. (1997). Formal and Real Authority in Organizations. *The Journal of Political Economy*, 105(1), 1–29.
- APM. (2014). *APM-BOK*. Association for Project Management.
- Argyris, C. (1977). Double Loop Learning in Organizations. *Harvard Business Review*, 55(5), 115–125.
- AXELOS Limited (Ed.). (2017). *PRINCE2* (6th edition). TSO.
- Bowen, G. A. (2009). Document Analysis as a Qualitative Research Method. *Qualitative Research Journal*, 9(2), 27–40. <https://doi.org/10.3316/QRJ0902027>
- Brown, S. R. (1980). Political Subjectivity: Applications of Q Methodology in Political Science.
- Bruggeman, E., Chao-Duvis, ., & Koning, . (2010). *A practical guide to Dutch building contracts*. Instituut voor Bouwrecht (IBR).
- Butt, A., Naaranoja, M., & Savolainen, J. (2016). Project change stakeholder communication. *International Journal of Project Management*, 34(8), 1579–1595. <https://doi.org/10.1016/j.ijproman.2016.08.010>
- Chao-Duvis, . (2012). *Het bouwteam model: Een studie naar de juridische vormgeving en het functioneren in de praktijk* (Vol. Bouwrecht monografieën). Instituut voor Bouwrecht (IBR).
- Correa Galdeano, F. (2022). *RISK FOR THE BOUWTEAM: Developing an empirical case-based model for risks, their allocation and control strategies when Bouwteams are used as Project Delivery Method* [Doctoral dissertation].
- CROW. (2023). *Handreiking Aanbesteden van twee fasen contracten* (tech. rep.). PIANOo / CROW.
- de Koning, J. (2023, July). Bouwteam of twee-fasenaanpak?
- Galbraith, J. R. (1974). Organization Design: An Information Processing View. *European Institute for Advanced Studies*, 4(3), 28–36.
- Hwang, B.-G., & Low, L. K. (2012). Construction project change management in Singapore: Status, importance and impact. *International Journal of Project Management*, 30(7), 817–826. <https://doi.org/10.1016/j.ijproman.2011.11.001>
- Ibbs, W., Nguyen, L. D., & Lee, S. (2007). Quantified Impacts of Project Change. *Journal of Professional Issues in Engineering Education and Practice*, 133(1), 45–52. [https://doi.org/10.1061/\(ASCE\)1052-3928\(2007\)133:1\(45\)](https://doi.org/10.1061/(ASCE)1052-3928(2007)133:1(45))
- Isaac, S., & Navon, R. (2008). Feasibility Study of an Automated Tool for Identifying the Implications of Changes in Construction Projects. *Journal of Construction Engineering and Management*, 134(2), 139–145. [https://doi.org/10.1061/\(ASCE\)0733-9364\(2008\)134:2\(139\)](https://doi.org/10.1061/(ASCE)0733-9364(2008)134:2(139))
- ISO. (2021). Project, programme and portfolio management - Guidance on project management.
- Jansen, I., Metsemakers, F., & Technische Universiteit Eindhoven (TUE). Bouwkundige Studievereniging Cheops. (1999). *Toekomst voor het bouwteam?* Technische Universiteit Eindhoven.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305–360. [https://doi.org/10.1016/0304-405X\(76\)90026-X](https://doi.org/10.1016/0304-405X(76)90026-X)
- Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, 47(2), 263–291. <https://doi.org/10.2307/1914185>
- Kerzner, H. (2009, April). *Project Management: A Systems Approach to Planning, Scheduling, and Controlling*. John Wiley & Sons.
- Larson, E. (1995). Project partnering: Results of study of 280 construction projects. *Journal of Management in Engineering*, 11(2), 30–35. [https://doi.org/10.1061/\(ASCE\)0742-597X\(1995\)11:2\(30\)](https://doi.org/10.1061/(ASCE)0742-597X(1995)11:2(30))
- Love, P. E. D., Davis, P. R., Cheung, S. O., & Irani, Z. (2011). Causal Discovery and Inference of Project Disputes. *IEEE Transactions on Engineering Management*, 58(3), 400–411. <https://doi.org/10.1109/TEM.2010.2048907>
- Macneil, I. R. (1980). *The New Social Contract: An Inquiry Into Modern Contractual Relations*. Yale University Press.

- Mejl  nder-Larsen,  . (2017). Using a change control system and building information modelling to manage change in design. *Architectural Engineering and Design Management*, 13(1), 39–51. <https://doi.org/10.1080/17452007.2016.1220360>
- Meyer, J. W., & Rowan, B. (1977). Institutionalized Organizations: Formal Structure as Myth and Ceremony. *American Journal of Sociology*, 83(2), 340–363.
- Ng, S., Rose, T. M., Mak, M., & Chen, S. E. (2002). Problematic issues associated with project partnering — the contractor perspective. *International Journal of Project Management*, 20(6), 437–449. [https://doi.org/10.1016/S0263-7863\(01\)00025-4](https://doi.org/10.1016/S0263-7863(01)00025-4)
- Nikulina, A., Volker, L., & Bosch-Rekveltdt, M. (2022). The interplay of formal integrative mechanisms and relational norms in project collaboration. *International Journal of Project Management*, 40(7), 798–812. <https://doi.org/10.1016/j.ijproman.2022.08.006>
- Orton, J. D., Douglas, J., & Weick, K. (1990). Loosely Coupled Systems: A Reconceptualization. *Academy of Management Review*, 15, 203–223. <https://doi.org/10.2307/258154>
- Ouchi, W. (1979). A Conceptual Framework for Design of Organisational Control Mechanism. *Management Science*, 25, 833–848. <https://doi.org/10.1287/mnsc.25.9.833>
- PMI. (2021). *A guide to the project management body of knowledge (PMBOK® Guide)* (7th edition).
- Poppo, L., & Zenger, T. (2002). Do Formal Contracts and Relational Governance Function as Substitutes or Complements? *Strategic Management Journal*, 23(8), 707–725.
- Sharma, R., Sohi, A. J., Hertogh, M. J. C. M., & Deketh, J. R. (2017). Controlling the uncontrolled by noticing the unnoticed. *2017 12th International Scientific and Technical Conference on Computer Sciences and Information Technologies (CSIT)*, 2, 106–114. <https://doi.org/10.1109/STC-CSIT.2017.8099435>
- Simon, H. A. (1955). A Behavioral Model of Rational Choice. *The Quarterly Journal of Economics*, 69(1), 99–118. <https://doi.org/10.2307/1884852>
- Staw, B. M. (1981). The Escalation of Commitment to a Course of Action. *The Academy of Management Review*, 6(4), 577–587. <https://doi.org/10.2307/257636>
- Stephenson, W. (1935). Correlating Persons Instead of Tests. *Journal of Personality*, 4(1), 17–24. <https://doi.org/10.1111/j.1467-6494.1935.tb02022.x>
- Suprpto, M. (2016). Collaborative Contracting in Projects.
- Turner, R., & Keegan, A. (2001). Mechanisms of governance in the project-based organization: Roles of the broker and steward. *European Management Journal*, 19, 254–267. [https://doi.org/10.1016/S0263-2373\(01\)00022-6](https://doi.org/10.1016/S0263-2373(01)00022-6)
- Ullman, D. G. (2010). *The mechanical design process* (4th Ed). McGraw-Hill.
- Wang, C., Yap, J. B. H., Wood, L. C., & Abdul-Rahman, H. (2019). Knowledge modelling for contract disputes and change control. *Production Planning & Control*, 30(8), 650–664. <https://doi.org/10.1080/09537287.2019.1572247>
- Watts, S., & Stenner, P. (2005). Doing Q methodology: Theory, method and interpretation. *Qualitative Research in Psychology*, 2(1), 67–91. <https://doi.org/10.1191/1478088705qp022oa>
- Whyte, J., & Lobo, S. (2010). Coordination and control in project-based work: Digital objects and infrastructures for delivery. *Construction Management and Economics*, 28(6), 557–567. <https://doi.org/10.1080/01446193.2010.486838>
- Williamson, O. E. (1985). *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*.
- Winch, G. (2010). *Managing construction projects: An information processing approach* (2nd ed). Wiley-Blackwell.



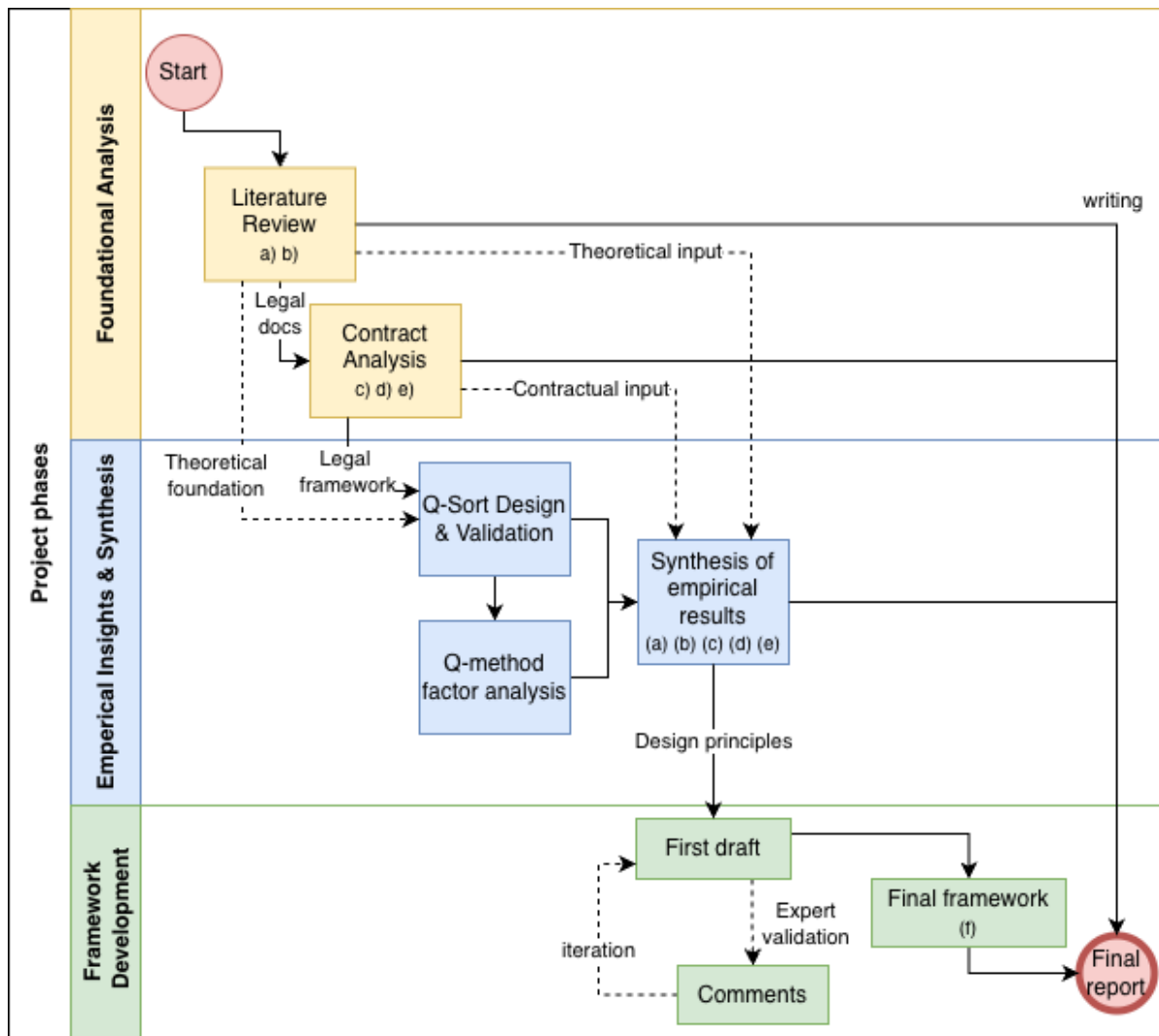
Swimlane diagram

The swimlane diagram provides an overview of how the applied methods jointly address the sub-questions of this thesis. The diagram should be read as an analytical structure rather than as a strictly linear research protocol.

The figure distinguishes three main phases. The first phase, foundational analysis, consists of a literature review and a contract analysis. Together, these provide the theoretical and contractual input for the study by delineating how scope-related decisions, roles, procedures, and contractual responsibilities are addressed in bouwteam arrangements and their transition to UAV or UAV-GC.

The second phase, empirical insights and synthesis, comprises the design and application of the Q-method. Through Q-set development, factor analysis, and interpretative synthesis, this phase captures how scope-related decisions are formed, documented, and interpreted in practice, and how these decisions are perceived once projects transition into the realisation phase. The synthesis integrates empirical findings with contractual insights and constitutes the analytical basis for identifying design principles.

The third phase, framework development, translates the design principles derived from the synthesis into a governance framework. This framework is developed iteratively through prototyping and expert validation. It is explicitly positioned as a design response to insights emerging from the preceding analyses, rather than as a predefined solution. All phases ultimately converge in the final report, where the research findings and the governance framework are consolidated.



- a)** How are scope-related issues raised, discussed, and progressively framed as decisions during the bouwteam phase?
- b)** How are scope-related decisions documented in practice, and how do project participants assess the adequacy of this documentation in terms of clarity and traceability?
- c)** How do actor roles and procedural arrangements within bouwteam agreements (particularly DG2020) shape how scope-related decisions are formed and recorded?
- d)** How are scope-related decisions from the bouwteam phase interpreted once the project transitions to the realisation phase under UAV or UAV-GC?
- e)** How does the shift in contractual roles and liability affect how reliable bouwteam-era scope decisions are perceived to be?
- f)** Which governance arrangements can support the robustness of scope-related decision-making in bouwteam projects, particularly in relation to traceability and transferability across project phases?

Figure A.1: Swimlane diagram: how methods provide answers to sub-questions

B

Case Study Profiles

This appendix provides the contextual profiles of the five case studies included in this research. Each table summarises essential project characteristics that support the interpretation of Q-sort results. The information was provided by contact persons from each case study through online communication.

B.1. Project R-Net busbaan Leiden–Katwijk

Table B.1: Case 1 characteristics: Project R-Net busbaan Leiden–Katwijk

Project type	Infrastructure
Project size	Large (> €25M)
Bouwteam agreement	DG2020, with additions and amendments from the Province of Zuid-Holland included in the contract appendix.
Execution-phase contract	UAV-GC 2005
Design stage at start and athandover	At the start of the bouwteam, schematic designs (SO) and preliminary designs (VO) existed for different parts of the work. The design was further developed up to the detailed design (DO) stage.
Estimated total cost of scope changes	High (>5%) — at the start of the bouwteam it was already known that the project scope was still evolving. Both the client and external stakeholders introduced additional elements to the scope during the process.
Short project characterisation (2–3 sentences)	Bouwteam phase for a project in a highly sensitive environment with challenging stakeholders on all sides, adjacent to the N206 Tjalmaweg project, which had generated local dissatisfaction. During the design phase, two parties worked in parallel on design development to maintain momentum.

B.2. Groot onderhoud Afvalwaterriool Zuid–Aalst

Table B.2: Case 2 characteristics: Groot onderhoud Afvalwaterriool Zuid–Aalst

Project type	Renovation
Project size	Medium — started with a target budget of €12.5 million, which increased to €24.1 million after all scope changes.
Bouwteam agreement	DG2020
Execution-phase contract	UAV 2012
Design stage at start and at handover	The bouwteam started from a preliminary design (VO) prepared by Haskoning. The design was developed up to the execution design (UO).
Estimated total cost of scope changes	High (>5%) — approximately +200%. Initially, changes resulted from deviations in the existing asset data and an increased ambition on the client's side. Later, a second comparable project was added to the scope when the upstream sewer was found to be collapsing and urgent intervention was required, for which the contractor's support was essential.
Short project characterisation (2–3 sentences)	Renovation of an old concrete sewer with a diameter of approximately 1.9 m, located 3–4 m below ground level. The main technical challenge (where the contractor's expertise was critical) was to ensure sufficient drainage capacity during the renovation works. The required mitigation measures had significant effects on the surrounding area, including residential properties, gardens, and landscape elements that had to be preserved.

B.3. Renovatie hoofdrioolgemaal Slauerhofflaan

Table B.3: Case 3 characteristics: Renovatie hoofdrioolgemaal Slauerhofflaan

Project type	Building (renovation of the pumping station and installations) and infrastructure (construction of a pressure pipeline).
Project size	Small (< €5 million).
Bouwteam agreement	DG2020
Execution-phase contract	UAV 2012.
Design stage at start and at handover	The bouwteam started from a reference design (SO/VO level) and transferred to the execution phase based on a specification design.
Estimated total cost of scope changes	Low (<1% of the total project cost).
Short project characterisation (2–3 sentences)	The project involved technical uncertainty regarding the condition of the pressure pipeline combined with the complete renovation of the main pumping station, while wastewater flows had to be temporarily diverted. Collaboration within the bouwteam was variable and occasionally led to friction due to differences in insight and communication style.

B.4. Groot onderhoud Julianasluis

Table B.4: Case 4 characteristics: Groot onderhoud Julianasluis

Project type	Renovation of a movable hydraulic structure (planned maintenance, conducted once every 15 years)
Project size	Medium – Approximately €20 million
Bouwteam agreement	DG2020
Execution-phase contract	Several partial contracts under UAV 2012
Design stage at start and at handover	During the bouwteam phase, both the preliminary design (VO) and detailed design (DO) were prepared. For several elements, it was decided to already develop an execution design (UO) during the bouwteam phase.
Estimated total cost of scope changes	High (>5%) – during the preparation phase (prior to tendering the bouwteam), investigations, analyses, and calculations were carried out, leading to several assumptions about the condition of the structure (since not everything could be inspected beforehand). An initial package of renovation measures was defined. Within the bouwteam, this package was further elaborated and additional investigations were performed, progressively clarifying the exact scope. In several areas, the condition turned out worse than expected.
Short project characterisation (2–3 sentences)	A complex renovation of a facility comprising six movable hydraulic structures (two locks and four bridges), heavily used by both road and waterway traffic. The project combined mechanical engineering, electrical systems, machine safety, and civil engineering disciplines within a highly integrated and operationally sensitive environment.



Q-sort Statements

Each of the 41 statements in the Q-set was developed based on free interpretation of bouwteam context, theoretical background and the contract analysis. A subset of statements was refined or added based on expert input during Q-set validation interviews, or formulated through the researcher's analytical interpretation of the studied context. Table C.1 provides an overview of all statements and their source references.

Table C.1: Source overview of Q-set statements

No.	Statement	Originating source(s)	Report section (fn)
1	It was usually clear which element of the project a scope change decision was about.	Ibbs et al., 2007; Love et al., 2011	3.3.2 (5)
2	Scope change discussions often mixed technical, financial and planning issues, making it unclear what the decision was really about.	Galbraith, 1974	3.6.2 (18)
3	It was clear who had the authority to make final decisions on proposed scope changes.	Aghion and Tirole, 1997	3.4.4 (12)
4	Decisions about scope changes were often made by whoever happened to be most involved, rather than by the formally responsible party.	Aghion and Tirole, 1997	3.4.4 (13)
5	The decision-making arrangements set at the start of the bouwteam were consistently followed during the process.	Kahneman and Tversky, 1979; Staw, 1981	3.4.2 (9)
6	Scope change decisions were systematically documented, including the reasons and approvals.	Ibbs et al., 2007; Love et al., 2011	3.3.2 (6)
7	Scope change decisions were prepared collaboratively, integrating the knowledge of each of the parties involved evenly.	Butt et al., 2016; Ng et al., 2002	3.6.2 (16)
8	Contractors were sometimes only pseudo-involved in scope change decisions, having limited actual influence.	Ng et al., 2002	3.6.2 (15)
9	The collaborative scope change process was documented, including the context like causes and consequences.	Ibbs et al., 2007; Love et al., 2011	3.3.2 (7)
10	The project team generally reached consensus about what fell inside or outside the agreed scope.	Kerzner, 2009	3.1.1 (2)
11	Scope changes followed a structured sequence—initiation, evaluation, assessment, decision, and implementation.	ISO, 2021	3.3.1 (a)
12	Scope changes that developed naturally, without strict go/no-go decisions, were often more efficient and productive.	Suprpto, 2016	3.4.2 (10)
13	It was often unclear who raised a change, when, and why.	Hwang and Low, 2012; Love et al., 2011	3.3.1 (4)

No.	Statement	Originating source(s)	Report section (fn)
14	Change proposals were reviewed early to avoid uncontrolled development and duplicate assessment work.	PMI, 2021	3.3.1 (b)
15	Assessments of scope changes resulted in clear, updated documents such as revised risk registers or cost estimates.	APM, 2014	3.3.1 (c)
16	Approval and escalation outcomes regarding scope changes were clearly recorded before implementation.	ISO, 2021	3.3.1 (d)
17	Every approved scope change was systematically implemented into the relevant bouwteam documents.	AXELOS Limited, 2017	3.3.1 (e)
18	At all times throughout the bouwteam, the project team knew which version of the bouwteam documents was most recent.	Whyte and Lobo, 2010	3.6.3 (20)
19	The length of the bouwteam period made it difficult to balance formal documentation with informal discussions about scope changes.	Chao-Duivis, 2012	2.2 (1)
20	Budget pressures often influenced how scope changes were framed or justified.	Expert input*	-
21	Ambiguity in earlier bouwteam decisions creates accountability issues during the realization phase.	Ibbs et al., 2007; Love et al., 2011	3.3.2 (8)
22	Combining responsibility for design and construction within one party reduces coordination and interface risks.	Researcher interpretation**	-
23	Combining responsibility for design and construction within one party increases that party's exposure to uncertainty and risk.	Researcher interpretation**	-
24	In the realization phase, formal lines of authority leave limited space to maintain the open consultation that characterized the bouwteam.	UAV §3-4, UAV-gc §22-23	5.2 (26)
25	When it is unclear who initiated a change during the bouwteam—or when and why—it becomes difficult to determine responsibilities later on.	Simon, 1955	3.4.3 (11)
26	Without formal approval of bouwteam decisions, it becomes difficult to hold parties accountable once the realization phase begins.	UAV-gc §14-15	5.4 (29)
27	The execution of bouwteam scope changes often begins before they are formally approved, making them difficult to trace after handover.	DG2020 §11.2 footnote.	5.4 (27)
28	At the transition from bouwteam to realization, client and contractor interests diverge: the client seeks certainty, while the contractor resists liability for incomplete bouwteam results.	Researcher interpretation**	-
29	Not all bouwteam results are formally included in the realization contract; some are deliberately left out to keep flexibility or limit risk.	Researcher interpretation**	-
30	Price and liability negotiations at the transition from bouwteam to realization often reopen earlier bouwteam decisions.	DG2020 §11.2 footnote.	5.4 (28)
31	A tool that links requirements and scope would help prevent scope drift in bouwteam projects.	Isaac and Navon, 2008	3.6.4 (21)
32	A change register that documents every change and its implications for the contract documents would improve traceability across phases.	Mejlænder-Larsen, 2017	3.6.4 (23)
33	A shared knowledge repository would strengthen inter-organizational learning and accountability in bouwteam projects.	Whyte and Lobo, 2010	3.6.4(24)

No.	Statement	Originating source(s)	Report section (fn)
34	A structured way to record bouwteam decisions so that they stay valid in the realization phase would help prevent disputes.	Nikulina et al., 2022; Wang et al., 2019	3.6.4 (24)
35	Digital traceability systems would improve accountability but can make collaboration overly formal.	Isaac and Navon, 2008	3.6.4 (22)
36	Setting clear moments to freeze the design would help create structure for the transition to realization.	Ullman, 2010	3.6.3 (19)
37	Effective scope change tools depend more on behavioral discipline and ownership than on new software.	Meyer and Rowan, 1977	3.6.1 (14)
38	Overly formal procedures for transferring bouwteam agreements to realization can damage trust and openness.	Larson, 1995	3.2.1 (3)
39	Central oversight of documentation by the client improves traceability but weakens joint ownership of decisions.	Butt et al., 2016; Ng et al., 2002	3.6.2 (17)
40	Before the bouwteam started, everyone in the project team clearly understood what was and wasn't included in the project scope.	Expert input*	-
41	A clear and shared project scope at the start of the bouwteam would reduce the risk of delays and cost increases.	Expert input*	-

* Statements informed by expert input obtained during validation interviews of initial Q-set.

** Statements formulated through researcher interpretation based on synthesis of literature and contract analysis.

D

Statistical Procedures in Q-Methodology

This appendix documents the mathematical procedures underlying the Q-methodological analysis. The main text provides a conceptual description; the material below offers the technical foundations for transparency and replicability.

D.1. Correlation Between Q-Sorts

Q-methodology applies by-person factor analysis, meaning that correlations are computed between complete Q-sorts rather than between variables. Following Brown (1980), KADE calculates intercorrelations using the standard Pearson product-moment correlation coefficient:

$$r_{xy} = \frac{\sum_{i=1}^N (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^N (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^N (y_i - \bar{y})^2}},$$

where x_i and y_i denote the scores assigned by two participants to statement i , $\bar{x}$ and $\bar{y}$ denote the respective means, and N is the number of statements ($N = 41$).

D.2. Centroid Factor Extraction

Factor extraction was carried out using the classical centroid method, the standard extraction approach in Q-methodology (Brown, 1980). Centroid extraction identifies broad patterns of shared variance across Q-sorts without imposing a mathematically unique or optimal solution, reflecting the interpretive orientation of Q-methodology.

Unlike principal components analysis, centroid extraction:

- avoids reliance on matrix inversion and is therefore robust for small-sample Q-studies,
- provides a stable starting configuration for subsequent rotation,
- and prioritises the discovery of interpretable viewpoints rather than maximising explained variance.

The number of factors retained was not determined automatically but selected on substantive grounds following Brown's retention criteria: eigenvalues above 1.0, the presence of multiple significantly loading exemplars, and conceptual coherence of factor arrays, all discussed in section ??

D.3. Varimax Rotation

After extraction, the factor solution was rotated to obtain a clearer and more interpretable structure. KADE applies orthogonal *varimax rotation*, which maximises the variance of loadings within each factor (Watts & Stenner, 2005).

Varimax rotation:

- increases the spread of loadings (large loadings become larger; small loadings smaller),
- reduces cross-loadings between factors,
- and orients the factor axes such that Q-sorts tend to load strongly on a single factor.

Rotation alters only the orientation of the factor axes, not the underlying correlation matrix.

D.4. Significance of Factor Loadings

The loading of each Q-sort indicates its correlation with the factor. Only Q-sorts whose loadings exceed a statistical threshold are retained as *factor exemplars*, which jointly define the composite viewpoint represented by the factor.

Following standard Q-method practice (Brown, 1980; Watts & Stenner, 2005), the significance of a factor loading is assessed using:

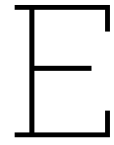
$$\text{Loading threshold} = \frac{z}{\sqrt{N}},$$

where N is the number of statements and z is the critical value of the standard normal distribution. The critical z -values (2.58 and 3.29) correspond to the 99% and 99.9% confidence points of the standard normal distribution.

For $N = 41$, this yields:

$$p < 0.01 : \frac{2.58}{\sqrt{41}} \approx 0.40, \quad p < 0.001 : \frac{3.29}{\sqrt{41}} \approx 0.51.$$

This study adopted $p < 0.01$, which provided statistical rigour while ensuring a sufficient number of exemplars per factor for stable interpretation.



Validation Interviews

This appendix presents concise summaries of the validation interviews conducted with respondents from the case studies introduced in Appendix B. Each interview was held via Microsoft Teams and transcribed in full to support accurate interpretation. The summaries capture the main insights that respondents shared regarding decision-making, collaboration, and scope change management in bouwteam projects. They also include freely translated key quotations that provide more concrete evidence of each respondent's perspective while preserving anonymity. Together, these interviews serve to validate and contextualise the factor interpretations derived from the Q-methodological analysis.

E.1. Project R-Net busbaan Leiden–Katwijk

CASE 1: Infrastructure project under a DG2020 bouwteam agreement, with additions from the Province of Zuid-Holland (see B.1). At the start of the bouwteam, schematic and preliminary designs (SO/VO) were available for different parts of the work and were jointly developed towards a detailed design (DO). Scope development during the bouwteam was substantial due to evolving client requirements and stakeholder pressures in a sensitive project environment.

Client – Contract Manager

Date: 11 November 2025

Process control and documentation. The respondent emphasised that the bouwteam process suffered from inconsistent behavioural discipline rather than inadequate procedures. Agreements made at the start were not structurally followed, and scope-related decisions were frequently shaped in one-on-one conversations before they entered the formal process. This created blind spots for traceability and accountability. She stressed that documentation was often incomplete at moments when it mattered most: "decisions were prepared outside the formal structure, so the project lost grip on why choices were made."

Role clarity and discussion dynamics. Scope-change discussions regularly merged technical, financial, and planning aspects, which she felt complicated decision-making and blurred responsibilities. She highlighted the need for someone—typically the client side—to maintain analytical overview and ensure that the formal mandate structure remained intact. At the same time, she argued that bouwteams require flexibility, making rigid adherence to procedures counterproductive. As she framed it: "If you go 100% by the book the bouwteam does not work, but without structure you lose control."

Price formation and collaboration. She described price formation as difficult, particularly when contractors submitted unrealistically low offers during the bouwteam phase. Rather than framing this as opportunistic behaviour, she interpreted it as a downstream effect of weak process transparency and insufficient control over change preparation. Still, she emphasised that collaboration remained constructive and consensus was always achieved, even when the underlying governance process was fragmented: "There was always consensus in the end, even when the process was messy."

Interpretation The respondent's perspective aligns closely with Factor 2. She values collaborative, informal interaction but is acutely aware of how informal decision-making creates vulnerability: unclear rationales behind choices, difficulty reconstructing decisions later, and a reliance on individual behaviour

rather than system safeguards. Her emphasis on ownership, disciplined behaviour, and the need for a balanced blend of flexibility and structure mirrors the core reasoning style of the Factor 2 viewpoint and aligns perfectly with her Q-sort factor loading.

Contractor – Project Manager

Date: 13 November 2025

Process control and documentation. The respondent described scope change handling as mostly well-controlled in practice, but highly dependent on informal communication and personal discipline. He repeatedly emphasised that early-phase discussions, where the foundations of a change were laid, were often not documented. This caused gaps later in the process: decisions were clear to the people involved, but not reconstructable for others. He characterised himself as someone who prefers talking over writing, which contributed to missing documentation in the early stages. “You brainstorm together, but you do not write it down — yet that is where the basis of the decision is made.”

Mandate clarity and decision structure. Unlike many others, he experienced near-complete clarity about who was responsible and who ultimately decided. As he explained, “I knew exactly who my direct and indirect client was.” He considered this transparency essential for navigating scope development, particularly because his project had a highly fluid scope that evolved deep into the bouwteam phase. Even though not all decisions were taken at the ideal moment, he stressed that authority was never ambiguous.

Design development, scope clarity and change dynamics. A central theme in his account was the incomplete and evolving scope at the start of the bouwteam. Requirements were not fixed, and design choices were still open far into the process. He viewed this not as a flaw, but as inherent to the project’s nature — a degree of uncertainty that allowed iterative development and optimisation. However, he recognised that this can be difficult for more process-driven colleagues: “For people who are very procedural, the idea that ‘the requirements are not there yet’ is a mindset shift.”

Price formation and financial considerations. He noted that cost development during the bouwteam was affected by the evolving design and by additional wishes from the municipality. This could lead to final prices deviating from earlier estimates, though he did not describe this as opportunistic or pressured behaviour. Instead he framed it as a natural result of engineering refinement and legitimate additions: “If you give a rough price and later engineer everything in detail, the price can change.” He also emphasised that discussions about price impacts were constructive, not adversarial.

Interdisciplinary workflows and digital tools. He highlighted strong use of model-based collaboration within the design team, where thousands of comments were logged and processed in structured systems. However, this discipline did not carry over into early change discussions. He suggested that improvements in documentation could come from simple organisational support: “It would help if someone sits in, writes the notes, and afterwards you just verify: is this what we agreed?”

Interpretation. This respondent shows a mixed but distinctive profile. His comfort with informality, reliance on verbal coordination, and acceptance of evolving scope align partially with Factor 2. However, his strong appreciation for early transparency, mandate clarity, and structured downstream design coordination show clear affinity with Factor 1 as well. He represents a pragmatic middle position: informal and trust-based in the frontend, disciplined and structured once engineering begins. This balanced perspective does not align with his clear Factor 1 Q-sort result.

Contractor – Design Leader

Date: 13 November 2025

Process control, handovers and documentation. The respondent consistently emphasised that the bouwteam suffered from fragmented information management and unclear transitions between phases. He described how design updates, change implications and technical decisions were often not systematically recorded, leaving later stages with unresolved questions. The lack of a controlled handover from bouwteam to realisation created avoidable rework: “You start with a pile of documents, but you do not know what has been agreed, what is old, and what is still valid.”

Mandate clarity and decision ownership. Throughout the interview he stressed that the roles and

responsibilities in the bouwteam were blurry. Decision-making authority was not always explicit, causing delays and circular discussions. He noted that parties frequently assumed responsibilities without formal mandate, especially within sub-disciplines. This undermined traceability: “People made choices because they were involved, not because they were the one who was supposed to decide.”

Interdisciplinary coordination and sub-discipline alignment. A major theme was the difficulty of coordinating between technical disciplines once the design became more detailed. Interfaces were not consistently overseen, and sub-disciplines sometimes progressed independently without ensuring alignment. He saw this as one of the most significant risks for scope changes downstream. Early-stage coordination was insufficiently structured: “Disciplines solved their own part, but the coherence between them was not always safeguarded.”

Design stability and consequences for execution. He described the design as continuously evolving, with substantial changes occurring late in the process. This instability complicated planning and cost predictability in the realisation phase. Although some degree of evolution is acceptable, he argued that the bouwteam should have established firmer freeze moments and clearer baselines. Without them, technical teams lacked a stable point of reference.

Communication and discussion quality. He characterised the bouwteam culture as constructive but sometimes too informal. Discussions mixed strategic, technical and contractual issues without a clear structure, which, in his view, diluted decision quality. The absence of a strong process facilitator meant that meetings relied heavily on individual initiative. “Everyone talked, but not always about the same thing — someone has to guide that.”

Price formation and external pressures. Budget constraints were present but not described as distorting behaviour. Instead, he framed financial discussions as symptoms of upstream ambiguity. Because requirements were not consistently agreed upon, cost impacts were neither predictable nor traceable. He interpreted this as a governance deficit rather than conflict or opportunism.

Interpretation. The respondent aligns clearly with Factor 2. He accepts and even values informal, conversational decision-making, and he experiences limited discomfort when scope, requirements or roles are still evolving. His concerns arise mainly when informal processes become opaque: undocumented early agreements, unclear handovers, or discipline interfaces that are not explicitly coordinated. Rather than calling for stricter procedural structure, he emphasises behavioural discipline, shared understanding and practical facilitation. This combination – tolerance for informality, paired with frustration about its vulnerable edges – places him firmly within the Factor 2 mindset. This clear perspective only aligns slightly with the Q-sort loading as he does load on Factor 2 but not significant enough to contribute to the factor array.

E.2. Groot onderhoud afvalwaterriool Zuid-Aalst

CASE 2: Renovation project delivered under a DG2020 bouwteam agreement (see B.2. At the start of the bouwteam, a preliminary design (VO) was available and further developed towards the execution design (UO). Scope development during the bouwteam was extensive due to inaccurate asset data, changing client ambitions, and the urgent addition of a collapsing upstream sewer section that significantly expanded the project’s scope.

Client – Contract Manager

Date: 12 November 2025

Process control and documentation. The respondent characterised the bouwteam process as largely well structured, with clear routines for decision-making and documentation. He emphasised that the team consistently maintained traceability of scope changes through notes, registers, and structured communication. According to him, documentation was not a burden but a safeguard ensuring continuity and preventing misinterpretation: “if it is written down, there is no discussion later.” He contrasted this with other projects where informal practices created avoidable ambiguity.

Mandate, responsibilities, and role execution. He described a governance structure in which mandates were clear from the start and consistently adhered to. Each discipline had defined responsibilities and decision rights, which supported efficient progression through design phases. He also stressed that

the client organisation deliberately remained close to the process, but without micromanaging. This balance enabled the contractor to operate with autonomy while preserving formal accountability. As he explained: “everyone knew exactly who decided what, and that made the process calm.”

Coordination between disciplines. He viewed interdisciplinary collaboration as one of the strongest aspects of the bouwteam. He noted that the core team communicated frequently, prevented silo behaviour, and shared design developments early. Coordination challenges did arise, but in his view these were normal to complex renovation projects rather than symptoms of weak governance. Early involvement of key technical roles ensured alignment: “the moment something shifted in one discipline, the others were immediately aware.”

Design development and scope clarity. Although the project faced changing asset information and evolving client ambitions, he did not frame this as mismanagement. Instead, he saw it as inherent to sewer renovation projects. The team responded by updating the scope systematically and integrating changes into the developing design. For him, the strength lay in how such uncertainty was handled, not in eliminating it entirely: “things changed, but we kept the scope transparent.”

Price formation and financial transparency. He reported that price development during the bouwteam was controlled and constructive. The contractor provided rationale behind cost drivers, and discussions remained grounded in shared project goals rather than negotiation tactics. He emphasised that mutual trust played a role, but that structured documentation ensured that the process did not depend solely on trust. A recurrent message was that “price discussions were based on facts, not on pressure.”

Interpretation. The respondent aligns clearly with Factor 1. He consistently emphasised structure, clarity of mandate, documented processes, cross-disciplinary coordination, and transparent price formation. His narrative frames formalisation and discipline not as bureaucratic constraints but as enablers of stable collaboration. The tone of his reflections matches the Factor 1 mindset: confidence in structured governance, comfort with formal decision-making, and trust in documentation to maintain control throughout scope development. This is consistent with his Q-sort perspective.

Client – Project Manager

Date: 14 November 2025

Process control and documentation. The respondent described the bouwteam process as structured and predictable, with clear documentation routines that ensured continuity between meetings. He stressed that decisions were generally well recorded and that the use of formal notes prevented misunderstandings later in the design process. At the same time, he recognised that documentation sometimes lagged behind the pace of technical discussion, creating brief moments of ambiguity. He framed this as an operational issue rather than a systemic one: “the process only falters when the documentation is not updated quickly enough.”

Mandate, responsibilities, and role clarity. He emphasised that mandate structures were well defined and consistently respected. Each participant knew their role and decision authority, which he considered essential for maintaining momentum. The client’s internal delegation was clear, enabling the project manager to make timely decisions without unnecessary escalation. He described this clarity as a stabilising factor: “uncertainty disappears the moment everyone understands exactly who carries which responsibility.”

Coordination between disciplines. The respondent characterised interdisciplinary collaboration as strong and constructive. He highlighted that the contractor’s technical leads were proactive in flagging issues early, which allowed the team to adjust design assumptions before they escalated. Coordination challenges, when they occurred, were minor and typically related to the evolving technical scope inherent to sewer renovation work. According to him, the shared understanding between disciplines was a central reason the project progressed smoothly.

Design development and scope clarity. The project’s scope was initially uncertain due to incomplete asset information and emerging client ambitions. He described this not as a failure of planning but as a normal condition for renovation projects. What mattered, in his view, was the strakheid with which the team integrated new information into the design. He noted that the scope became progressively clearer

during the bouwteam because the team maintained continuous alignment: “the scope was blurry at first, but it sharpened as soon as the right information came in.”

Price formation and financial framing. He expressed satisfaction with the transparency of price development. Cost build-up was explained thoroughly, enabling informed decision-making. He emphasised that open discussion of cost drivers prevented tension and contributed to trust between client and contractor. Price negotiations did occur, but he described them as fact-based rather than confrontational: “as long as both sides show their reasoning, the price finds its place naturally.”

Communication and discussion quality. He reported that communication in the bouwteam was open and solution-focused. Discussions did not drift unnecessarily, and disagreements were handled constructively. He viewed the tone of collaboration as professional and respectful, which in turn supported the formal governance framework.

Interpretation. The respondent aligns closely with Factor 1. He repeatedly emphasised structure, clarity of mandate, transparent documentation, early interdisciplinary coordination, and rational price development. His perspective reflects a high level of confidence in formal governance and process discipline. Where uncertainties existed, he framed them as expected characteristics of renovation projects rather than governance failures. His narrative mirrors, just like his Q-sort factor loading, the Factor 1 reasoning style: structured collaboration as the foundation for control, predictability, and shared understanding.

Contractor – Project Manager

Date: 18 November 2025

The respondent has more than ten years of experience working in bouwteam settings and drew on both the current project (Groot onderhoud Afvalwaterriool Zuid–Aalst) and a broader portfolio of bouwteam collaborations. While the Zuid–Aalst project functioned well, his reflections highlight structural conditions that determine whether bouwteams succeed or struggle.

Process control and documentation. He described Zuid–Aalst as a project with generally good process discipline, but emphasised that this is not the norm in bouwteams. In his broader experience, documentation is often incomplete, and decisions taken in informal settings sometimes fail to make it into the formal record. He stressed that this can later produce friction in execution, when the rationale behind earlier choices is no longer retrievable. What distinguished Zuid–Aalst, however, was that “everyone kept each other sharp,” ensuring that agreements were written down and traceability was maintained.

Mandate and role clarity. He repeatedly underlined the importance of clear mandate structures. According to him, many bouwteams derail because responsibilities are diffuse, especially on the client side. When no single person feels authorised to make decisions, discussions linger and scope becomes unstable. In Zuid–Aalst, by contrast, authority lines were explicit, and the client’s project manager was decisive. He framed this succinctly: “bouwteams collapse when no one dares to decide; here that was not a problem.”

Formal and informal decision-making. He emphasised that a bouwteam requires a balance between informal cooperation and structured decision-making. Too much formality suffocates collaboration, but too much informality leads to ambiguity and hidden decisions. He noted that informal pre-alignment is effective, provided that the outcomes are formally captured. His experience is that many bouwteams fail at this translation step. Zuid–Aalst succeeded because informal discussions were consistently followed by clear, written agreements.

Interdisciplinary and sub-discipline coordination. He credited the success of Zuid–Aalst partly to the technical maturity of the contractor’s engineering team and the openness of the client’s reviewers. Interdisciplinary coordination was not free of tension, especially in areas where existing sewer data proved unreliable, but the team maintained a shared problem-solving mindset. He contrasted this with other bouwteams, where “disciplines drift apart” and decisions become siloed, creating avoidable rework.

Design stability and design freeze. The respondent described design stability as largely dependent on the quality of initial asset information. Zuid–Aalst faced uncertainties, but these were handled pragmatically:

unstable parts of the scope were isolated, and the rest of the design could progress. He argued strongly for phased design freeze moments but stressed that freezes only work when the underlying data is reliable. In his words: “you cannot freeze mud.” He viewed Zuid–Aalst as a rare example where instability was kept within manageable boundaries.

Start scope clarity. He acknowledged that Zuid–Aalst began with an incomplete and evolving scope. Yet he did not see this as inherently problematic. For renovation work, an unclear start scope is almost inevitable. What matters is whether the project team has a shared ambition and a structured way to incorporate discoveries. He pointed out that client expectations were transparent, which prevented strategic behaviour or shifting goalposts.

Price formation and financial framing. He was explicit that price formation in bouwteams can be politically sensitive, particularly when the client’s internal budgetary expectations clash with emerging technical insights. In Zuid–Aalst, transparency in cost build-up diffused much of this tension. He emphasised that trust is essential: “if the client thinks you are gaming the numbers, you are finished.” He explained that strong technical reasoning—not tactical negotiation—should guide price adjustments.

External pressures. While he did not portray external pressures as dominant, he mentioned that municipal political expectations can impose implicit constraints on timing or budget tolerance. In Zuid–Aalst this remained manageable, but he noted that in other projects such pressures create unhealthy incentives to rush design decisions.

Communication and discussion quality. Communication in Zuid–Aalst was, in zijn woorden, volwassen and “without ego’s.” He considered this one of the project’s strongest assets. He contrasted this with other bouwteams where participants guard their discipline’s territory and constructive dialogue becomes impossible. According to him, respectful and open communication is the single most important determinant of bouwteam success.

Interpretation. The respondent aligns strongly with Factor 1. His narrative relies on structured decision-making, clear mandates, disciplined documentation, and transparent price reasoning. He acknowledges the value of informal cooperation but frames it as secondary to process clarity and formal capture of decisions. His reflections on other bouwteams reveal the vulnerabilities associated with weak governance, while his description of Zuid–Aalst highlights exactly the elements emphasised by the Factor 1 viewpoint that also results from his Q-sort: early clarity, orderly coordination, and a controlled, transparent decision-making structure.

E.3. Renovatie hoofdrioolgemaal Slauerhofflaan

CASE 3: Renovation of a wastewater pumping station and associated pressure pipeline under a bouwteam agreement based on DG2020 (see B.3). The bouwteam started from a reference design at SO/VO level and further developed it into a specification design for transfer to execution under UAV 2012. Scope development was limited, though technical uncertainty regarding the pipeline’s condition and the need to maintain continuous wastewater operations added complexity to coordination and decision-making.

Client – Technical Project Lead

Date: 11 November 2025

Process control and documentation. He stated that decisions and changes were insufficiently captured in a way that made later accountability possible. In his view, the core failure was not the absence of a tool but the absence of a habit: when an alternative was proposed, the team did not consistently record what it implied (“B has consequences for time, money and quality”), which later required reconstruction and dispute.

Mandate and decision ownership. He implied that decision ownership was vulnerable in practice: alternatives were introduced without clear responsibility for the downstream implications. Once the build-up of consequences was unclear, parties could later argue about what belonged to whose design responsibility.

Informal pre-alignment and hidden commitments. He described how decisions “moved along with the

conversation” but were not turned into explicit, shared commitments. This created a dynamic where choices felt agreed in the moment, but lacked a traceable rationale once pressure increased.

External pressure and budget dynamics. He linked several weak decisions to time pressure and budget framing. He described deadline pressure as being strategically used, and experienced cost discussions as dominated by “pluses” rather than balanced trade-offs, which made scope control reactive instead of steering.

Interpretation. This account aligns predominantly with Factor 2: the respondent describes a bouwteam in which informal decision-making and weak recording created vulnerable accountability, especially under time and budget pressure. At the same time, he does not reject collaboration as a concept; his emphasis is pragmatic: impose a simple discipline that forces every change to be translated into explicit, shared consequences, so that later phases cannot “catch up” on undocumented commitments.

Client – Project Manager

Date: 3 December 2025

Process control and documentation. The respondent characterised the bouwteam process as largely smooth and organically coordinated. Formal procedures existed in the contract documents, but were not rigidly followed because “things actually went well by themselves.” Decision-making flowed mainly through frequent technical meetings where all key decision-makers from both sides were present. According to the respondent, documentation and updates to registers were generally completed, though not always immediately: the team tended to resolve issues substantively first, and then “write it down afterwards.” He emphasised that this did not lead to significant traceability problems.

Mandate, responsibilities, and role clarity. He described decision-making as structured, even if much of the content work occurred within small technical subteams. Formal approval always rested with the appropriate responsible party, who would either join discussions or be consulted immediately after: “the one who was formally responsible said yes or no — that was clear.” Informal preparation within the technical group was normal, but final accountability was never bypassed.

Coordination between disciplines. The respondent reported strong and pragmatic coordination. Weekly or bi-weekly technical meetings were split into content-focused and planning/cost-focused sessions to avoid discussions “talking through each other.” This deliberate separation ensured that specialists could resolve design issues while project leads handled budgets and timelines. In his view, this structure prevented confusion and kept the process efficient, even when scope changes emerged unexpectedly.

Design development and scope clarity. He recalled that several scope changes arose from unexpected technical findings, but these were handled constructively and transparently. Nothing emerged later in the project that teams had “never heard of before,” and changes were typically reviewed jointly for technical necessity and financial consequences. Minor changes could proceed before formal approval when risks were negligible, but major changes always followed formal channels. Overall, scope development was steady and well understood across the team.

Price formation and behavioural dynamics. The respondent described cost discussions as the main source of friction — “that is always difficult.” He noted that one contractor behaved more opportunistically than the other, at times escalating discussions by bringing senior managers into technical meetings without notice. This behaviour affected trust, particularly because price-related tension sometimes overshadowed the collaborative tone of the bouwteam. Despite these moments, formal decision-making on prices and scope impacts remained controlled and transparent.

Communication and discussion quality. He emphasised that communication within the bouwteam was open and mostly constructive, although the interaction style between client and contractor representatives occasionally created friction. Still, meetings were generally effective, and the team avoided “big surprises.” He viewed the cultural side of collaboration as decisive: tools and templates can help, but “if people don’t really work together, a tool won’t fix that.”

Interpretation. The respondent’s perspective that follows from this interview aligns most closely with Factor 1: Organised Integral Control. He is comfortable with organically organised processes, informal preparation of decisions, flexible documentation practices, and a strong reliance on behavioural discipline

and trust. He sees tools as supportive but secondary, and emphasises the human side of coordination more than formal safeguards.

Client – Technical Controller (BT) and Site Supervisor (UAV)

Date: 17 November 2025

Trust and collaborative intent. The respondent repeatedly emphasised that trust was the essential foundation for the bouwteam. He explained that both sides needed to believe that proposals were made in the project's interest rather than for unilateral gain. This was not always straightforward: design optimisations proposed by the contractor sometimes appeared financially motivated, forcing the client team to question whether changes were “really better for the project or just better for them.” According to the respondent, the bouwteam only functioned because both sides continued to act in good faith and openly discussed underlying assumptions — “you want to trust each other, but you always have to look closely at what the other party really means.”

Formal structure and behavioural discipline. He stated that formal agreements were not consistently followed during the bouwteam phase. Although procedures existed, decision-making often drifted into informal channels, which he described as “not how it was meant to go.” The contractor occasionally explored alternatives without timely alignment, creating friction in the client team. The respondent stressed that behavioural discipline matters more than additional procedures: participants must fully consider the implications of what they propose and “not pull the project in their own direction.” When this discipline weakens, trust becomes fragile and discussions escalate unnecessarily.

Document management and version control. The respondent noted substantial challenges in keeping design documentation up to date. In several cases, execution advanced before final documents were formally approved, leaving him to supervise work based on professional judgement rather than confirmed designs. He described situations where “we were already outside making something that wasn't definitively fixed yet,” which created ambiguity about the latest version. While the team maintained risk registrations, the lack of synchronisation between documentation and actual work increased uncertainty during execution.

Scope clarity and joint reasoning. Despite process difficulties, the respondent experienced scope clarity as strong. Early in the bouwteam, the team jointly assessed high-risk elements — such as the feasibility of pulling a new pipe through an existing one — and quickly reached consensus when technical alternatives were necessary. He recalled that when the contractor proposed a new alignment due to unacceptable risks, “we had our client convinced within a very short time,” illustrating the team's ability to converge on reasoned solutions. He viewed this constructive technical dialogue as a key strength of the collaboration.

Behavioural discipline, ownership and technical judgement. Later in the project, the respondent observed situations where insufficient preparation by the contractor created tension. In one instance, a redesign required deep drilling through soil layers with groundwater pressure. Measures to prevent upward water leakage had not been included in the contractor's proposal. When challenged, the contractor argued that the risk was minimal, prompting the client to insist on appropriate measures: “are we going to build on gut feeling, or are we going to design it the way we know is technically right?” The respondent highlighted this as evidence that behavioural discipline and clear quality expectations must be agreed upfront to avoid downstream conflict.

Interpretation. The respondent's perspective aligns with both Factor 1 and Factor 2. He describes reliance on informal coordination, trust-based decision-making, and intuitive supervision when formal documents lag behind, but this did work relatively well. He values flexibility, but warns that without discipline and shared ownership, informality becomes a vulnerability. This reasoning pattern aligns mostly with Factor 1 but contains Factor 2 elements which aligns with his Q-sort factor loading.

E.4. Groot Onderhoud Julianasluis

CASE 4: Renovation of the Julianasluis complex, comprising two locks and four movable bridges, delivered under a DG2020 bouwteam agreement (see B.4). Preliminary and detailed designs (VO/DO) were developed during the bouwteam, and several components progressed to execution design (UO) due

to operational sensitivity. Scope development was substantial, with inspections revealing deterioration beyond initial expectations and requiring significant adjustments across mechanical, electrical, and civil disciplines.

Contractor – Project Manager

Date: 10 November 2025

Budget pressure and price formation. The respondent described budget pressure as the dominant force shaping decisions throughout the bouwteam phase. The initial task-setting budget of €11.9 million proved unrealistic once the work was examined in detail, ultimately converging at €23 million. He explained that “if you have no money in your pocket but you still want something, you must make choices,” illustrating how functional requirements consistently overruled aesthetic or optional improvements. Examples included limiting conservation work on bridge railings to essential repairs: the result was visually “a patchwork,” but functionally adequate. He repeatedly framed the issue not as opportunism or scope drift, but as a consequence of emerging insight into the true condition and complexity of the assets. In his words, “in the end, it is about fair work for fair money.”

Scope development and risk management. The respondent emphasised that the initial scope was defined only at a high, conceptual level. As joint inspections progressed, the team discovered deteriorated components, missing information, and technical constraints that deepened the required scope. He described the process as a funnel in which design clarity and price clarity developed simultaneously: “you work both technically and financially towards a landing point.” Many scope increases were not experienced as scope changes but as necessary refinement of what was already implicitly required. He argued that the real challenge lies in establishing realistic pricing early, noting that both client and contractor had been “too optimistic” at the outset. He also highlighted the difficulty of involving subcontractors early, since “they want a clear request, and we cannot give that before the design matures.”

Collaboration and decision-making. The respondent viewed collaboration as constructive and genuinely joint. He stressed that the contractor was fully involved in decisions, often co-developing design principles through “uitgangspuntennotities” that both teams reviewed and approved. He explicitly rejected the idea of pseudo-involvement: “it is our design, our principles, and our price — that is what you want in a bouwteam.” Decisions were made in consensus, and he did not encounter situations where the client overruled the contractor by majority or procedural dominance. Even when difficult cost–quality trade-offs were required, the tone remained cooperative.

Transition to realisation and perceived risks. Unlike many respondents, he did not experience tension or diverging interests at the transition from bouwteam to realisation. Instead, he described the contract form as offering “comfort,” because most risks had already been resolved collaboratively in phase 1. The team refined elements of the design well beyond DO level where necessary to eliminate uncertainty. He disagreed strongly with the notion that contractors resist responsibility for bouwteam outputs, emphasising that the shared development of design and price produced aligned interests. The only real friction point lay in continuity of personnel between phases: the transition moment did not align neatly with capacity planning, creating pressure to keep teams engaged even when formal assignment had not yet been issued.

Predictability, ownership and scope control. The respondent expressed a strong desire for predictability in both scope and pricing. He explained that much of what appears as scope change is in fact progressive insight: the work remains within the original conceptual boundaries but becomes “so much more complex” as inspections reveal underlying conditions. This creates the dilemma of distinguishing genuine scope changes from natural scope deepening. He argued that improved control requires earlier clarity but acknowledged that “you simply do not have all the information when you start from scratch.” He also suggested reserving an explicit allowance for the inherent uncertainty in multidisciplinary renovation projects.

Interpretation. The respondent’s account aligns clearly with Factor 1. He describes a bouwteam that functioned predictably, transparently and collaboratively: decisions were taken jointly, technical and financial insight matured in step, and the transition to realisation was experienced as stabilising because risks had already been resolved together. Although scope deepening and progressive insight played

a major role, he framed these as inherent characteristics of renovation work rather than symptoms of weak process control. His depiction of the bouwteam is therefore strongly characteristic of the Factor 1 viewpoint. This aligns slightly with his Q-sort output, although he did indicate Factor 2 characteristics like unclear start scope problems and budget pressures.

Client – Contract Manager

Date: 13 November 2025

Process structure and decision-making. The respondent described the bouwteam process as intentionally open at the start, with only a high-level scope in place. This was a conscious choice to select a partner before delving into technical detail. As the team developed the design together, decision-making did not follow a fixed sequence: discussions often occurred informally, and several decisions were effectively taken before they were recorded. He noted that the team “first made the decision and only afterwards wrote it down,” which created reverse-engineering of documentation and allowed ambiguity to persist. While he did not see price–liability negotiations reopening earlier decisions, he acknowledged that insufficient structure made it difficult to maintain a coherent overview of what had been formally agreed.

Documentation and traceability. Documentation lagged behind the reality of technical development. Although risks were identified and captured, they were not always “activated” — meaning they were noted on paper without triggering concrete follow-up actions. The respondent emphasised that this created a false sense of control: teams assumed issues were handled simply because they appeared in a register. A striking example was the hoisting-eye inspection, where a late-stage test revealed non-conformity just before installation. The team had assumed it would be fine — “there will probably have been someone who looked at it” — but the inspection contradicted that assumption. Because documentation had not kept pace, decisions had to be reconstructed after the fact, complicating the transition toward execution.

Role boundaries, silos, and responsibility. The respondent repeatedly pointed to silo dynamics as a root cause of coordination failures. Project management, contract management, and technical disciplines each assumed that others were handling crucial verification steps. This led to unaddressed risks and unclear ownership: “if everyone assumes someone else has checked it, that is where things go wrong.” He stressed that formal roles alone are insufficient — effective scope control requires behavioural discipline and someone with a helicopter view who ensures that cross-disciplinary implications are explicitly considered. Without this, important technical checks can slip through the cracks even when collaboration is generally constructive.

Transition to the execution phase. As the bouwteam neared completion, unresolved ambiguities resurfaced. The respondent observed that the contractor increasingly attempted to shift responsibility for incomplete bouwteam outputs back to the client. This was not necessarily adversarial, but reflected discomfort with unclear boundaries and open technical issues: “when you close the bouwteam too early, those decisions come back to you in the execution phase.” The lack of a clear freeze point meant that questions reappeared once detailed design resumed under UAV-2012, despite earlier agreement that the bouwteam results were “finished.” He described this as a recurring tension: the wish to carry the collaborative mindset into execution versus the contractual reality that responsibilities must ultimately be fixed.

Interpretation. The respondent aligns strongly with Factor 2: Vulnerable Informality. He is comfortable with early-stage openness and informal reasoning but is acutely aware of how delays in documentation, unactivated risks, and silo behaviour undermine accountability. His examples illustrate how informal decision-making creates exposure during the transition to execution and how unclear ownership enables responsibility-shifting. His reasoning emphasises behavioural discipline, cross-disciplinary ownership, and clearer freeze moments — all characteristic of the Factor 2 perspective.

Contractor – Contract Manager

Date: 18 November 2025

Underspecified starting scope and early scope pressure. The respondent emphasised that the bouwteam began from a consciously simplified measures list rather than a fully developed scope definition. Because many measures were only described in broad terms during the tender, the bouwteam had to “rediscover what each measure actually meant” once the full set of client requirements became visible. He acknowledged that the bouwteam is partly meant to clarify scope, but argued that in this case the level of abstraction was counterproductive: the team effectively had to restart scope definition after award. According to him, this was a direct consequence of the tendering strategy, which prioritised selection over substantive scope completeness.

Fragmented decision-making and lack of integrative steering. Throughout the interview, the respondent stressed that scope-related decisions were often developed and concluded within technical subgroups. Technical specialists advanced solutions based on feasibility, while financial, planning and stakeholder-related implications followed “a bit behind.” He noted that team members frequently held different understandings of the same scope change, because decisions were not escalated or synchronised through an integrated decision forum. As he put it, “technically the decisions were prepared well — but they were not taken in an integrated way.” This resulted in high volumes of “floating decisions,” unclear mandates, and recurring re-discussions as costs and planning impacts surfaced later.

Information asymmetry and inconsistent documentation. The respondent described repeated instances where team members did not know who initiated a change, when it had been introduced, or what consequences it carried. Information was unevenly distributed: decisions taken at the technical table were not consistently conveyed to the cost or planning tables, and some changes “popped up later” because they had not been openly communicated. He linked this not to missing tools but to weak behavioural discipline: “tools are not the issue; discipline is.” Because decisions were not consistently documented at the moment they were made, traceability weakened and scope management required backtracking.

Insufficient financial steering. Although cost engineers produced detailed DO-level estimates throughout the bouwteam, the respondent felt that these numbers were not used to steer choices. Technical reasoning dominated discussions, while cost became “a resultant rather than a driver.” Without a clear financial horizon or an agreed budget envelope, prioritisation became impossible: decisions accumulated without explicit trade-offs. He argued that a bouwteam can only function if technical, financial and planning considerations are weighed jointly — otherwise scope expands without conscious decision-making.

Complexity, interfaces and collaborative dynamics. The respondent noted that the multidisciplinary nature of the project amplified these issues: mechanical, civil, hydraulic and software disciplines each had their own processes, and the interdependence between them complicated decision-making. While technical cooperation within disciplines worked well, the interfaces were not consistently managed at the bouwteam level. This complexity placed even more importance on joint decision-taking, which he felt was insufficiently organised in this project.

Interpretation. The respondent’s viewpoint aligns clearly with Factor 2: Vulnerable Informality. His reasoning consistently highlights the risks of informal preparation, fragmented coordination, insufficient behavioural discipline, and the absence of integrated decision-making. He shows strong scepticism toward uncontrolled scope development and emphasises that without a clear decision structure and shared financial horizon, accountability becomes vulnerable. This matches the characteristic concern of Factor 2: informal processes that function in practice but erode control, traceability and shared ownership over scope.

F

Factor Analysis

This appendix documents the statistical outputs underlying the Q-method factor analysis reported in Chapter 6. The materials included here provide transparency regarding the extraction, rotation, and composition of the retained factor solution, enabling verification of the analytical decisions without repeating substantive interpretation.

F.1. Factor Extraction and Retention

Figure F.1 presents the eigenvalues and explained variance associated with the extracted factors. Based on eigenvalues greater than 1.0 and interpretability considerations, a two-factor solution was retained for further analysis.

	Factor 1	Factor 2
Eigenvalues	2.5723	2.6988
% explained variance	18	19
cumulative % explained variance	18	37

Figure F.1: Eigenvalues and explained variance for the extracted factors.

F.2. Rotated Factor Loadings

After extraction, factors were subjected to varimax rotation. Figure F.2 shows the rotated factor loadings for all Q-sorts, including the identification of defining Q-sorts used in constructing the factor arrays. Only Q-sorts with statistically significant loadings were retained as defining variables.

Num...	Participant	FG	Factor 1	F.	Factor 2	F.
12	Case 2 - OG/PM	F1-1	0.8147	☒	-0.1234	☐
6	Case 2 - ON/PM	F1-2	0.7222	☒	0.2245	☐
2	Case 3 - OG/PM	F1-3	0.7006	☒	-0.2985	☐
10	Case 1 - ON/PM	F1-4	0.6481	☒	-0.02	☐
11	Case 2 - OG/CM	F1-5	0.5913	☒	-0.1883	☐
8	Case 3 - OG/TH	F1-6	0.469	☒	0.1258	☐
5	Case 1 - OG/PM	F1-7	0.4607	☒	0.0286	☐
1	Case 4 - ON/PM	F1-8	0.3703	☐	0.2504	☐
7	Case 3 - OG/TPL	F2-1	-0.0965	☐	0.7869	☒
4	Case 1 - OG/CM	F2-2	-0.1672	☐	0.7561	☒
3	Case 4 - ON/CM	F2-3	-0.2276	☐	0.4719	☒
13	Case 4 - OG/CM	F2-4	0.0708	☐	0.4329	☒
14	Case 4 - OG/MPB	F2-5	0.2108	☐	0.3708	☐
9	Case 1 - ON/OL	F2-6	0.0634	☐	0.3244	☐

Figure F.2: Rotated factor loadings with defining Q-sorts indicated.

F.3. Factor Characteristics

Table F.1 summarises the statistical characteristics of the retained factors, including the number of defining Q-sorts, composite reliability, and the standard error of factor Z-scores. These indicators demonstrate that both factors exhibit high internal consistency and reliability.

Table F.1: Statistical characteristics of the retained factors.

Factor Characteristics

	Factor 1	Factor 2
No. of Defining Variables	7	4
Avg. Rel. Coef.	0.8	0.8
Composite Reliability	0.966	0.941
S.E. of Factor Z-scores	0.184	0.243

F.4. Correlation Between Factor Scores

To assess the degree of independence between the retained factors, correlations between factor scores were calculated. As shown in Table F.2, the correlation between Factor 1 and Factor 2 is low, indicating that the factors represent distinct viewpoints.

Table F.2: Correlations between factor scores.

Correlations between Factor Scores

	Factor 1	Factor 2
Factor 1	1	-0.1531
Factor 2	-0.1531	1

F.5. Factor Arrays

The factor arrays form the basis for factor interpretation by presenting the composite Q-sorts for each retained factor. Statements are positioned according to their Q-sort values and associated Z-scores, reflecting their relative importance within each perspective.

F.5.1. Factor 1

Table F.3 presents the factor array for Factor 1. This array is constructed from the defining Q-sorts associated with this factor.

Table F.3: Factor array for Factor 1, including Q-sort values and Z-scores.**Factor 1**

Threshold	Z-score	Q Sort Value	Number	Statement
P < 0.0001	-2.039	-4	13	It was often unclear who raised a change, when, and why.
P < 0.0001	-1.564	-4	24	In the realization phase, formal lines of authority leave limited space to maintain the open consultation that characterized the bouwteam.
P < 0.0001	-1.468	-3	27	Implementation of bouwteam scope changes often starts before formal approval, making them hard to trace after transition.
P < 0.0001	-1.46	-3	4	Decisions about scope changes were often made by whoever happened to be most involved, rather than by the formally responsible party.
P < 0.0001	-1.395	-2	2	Scope change discussions often mixed technical, financial and planning issues, making it unclear what the decision was really about.
P < 0.0001	-1.242	-2	28	At the transition from bouwteam to realization, client and contractor interests diverge: the client seeks certainty, while the contractor resists liability for incomplete bouwteam results.
P < 0.0001	-1.136	-2	29	Not all bouwteam results are formally included in the realization contract; some are deliberately left out to keep flexibility or limit risk.
P < 0.0001	-1.108	-1	20	Cost pressures often influenced how scope changes were framed or justified.
P < 0.0001	-0.403	-1	25	When it is unclear who initiated a change during the bouwteam, or when and why, it becomes difficult to determine responsibilities later on.
P < 0.0001	-0.401	-1	11	Scope changes followed a structured sequence: initiation, evaluation, assessment, decision, and implementation.
P < 0.0001	0.091	0	14	Change proposals were reviewed early to avoid uncontrolled development and duplicate assessment work.
P < 0.0001	0.285	0	16	Approval and escalation outcomes regarding scope changes were clearly recorded before implementation.
P < 0.0001	0.315	0	9	The collaborative scope change process was documented and contextualized.
P < 0.0001	0.567	1	6	Scope change decisions were systematically documented, including the reasons and approvals.
P < 0.0001	0.621	1	40	Before the bouwteam started, everyone in the project team clearly understood what was and was not included in the project scope.
P < 0.0001	0.655	1	5	The decision-making arrangements set at the start of the bouwteam were consistently followed during the process.
P < 0.0001	0.829	1	15	Assessments of scope changes resulted in clear, updated documents such as revised risk registers or cost estimates.
P < 0.0001	0.948	1	7	Scope change decisions were prepared collaboratively, integrating the knowledge of each of the parties involved evenly.
P < 0.0001	1.054	2	37	Effective scope change tools depend more on behavioral discipline and ownership than on new software.
P < 0.0001	1.382	3	17	Every approved scope change was systematically implemented into the relevant bouwteam documents.
P < 0.0001	1.591	4	36	Setting clear moments to freeze the design would help create structure for the transition to realization.
P < 0.0001	2.145	4	3	It was clear who had the authority to make final decisions on proposed scope changes.

F.5.2. Factor 2

Table F.4 presents the factor array for Factor 2, constructed analogously using the defining Q-sorts associated with this factor.

Table F.4: Factor array for Factor 2, including Q-sort values and Z-scores.**Factor 2**

Threshold	Z-score	Q Sort Value	Number	Statement
P < 0.0001	-2.162	-4	11	Scope changes followed a structured sequence: initiation, evaluation, assessment, decision, and implementation.
P < 0.0001	-1.597	-4	9	The collaborative scope change process was documented and contextualized.
P < 0.0001	-1.431	-3	5	The decision-making arrangements set at the start of the bouwteam were consistently followed during the process.
P < 0.0001	-1.421	-3	14	Change proposals were reviewed early to avoid uncontrolled development and duplicate assessment work.
P < 0.0001	-1.349	-2	17	Every approved scope change was systematically implemented into the relevant bouwteam documents.
P < 0.0001	-1.299	-2	6	Scope change decisions were systematically documented, including the reasons and approvals.
P < 0.0001	-1.11	-2	3	It was clear who had the authority to make final decisions on proposed scope changes.
P < 0.0001	-0.916	-1	16	Approval and escalation outcomes regarding scope changes were clearly recorded before implementation.
P < 0.0001	-0.896	-1	15	Assessments of scope changes resulted in clear, updated documents such as revised risk registers or cost estimates.
P < 0.0001	-0.851	-1	40	Before the bouwteam started, everyone in the project team clearly understood what was and was not included in the project scope.
P < 0.0001	-0.698	-1	7	Scope change decisions were prepared collaboratively, integrating the knowledge of each of the parties involved evenly.
P < 0.0001	-0.166	0	24	In the realization phase, formal lines of authority leave limited space to maintain the open consultation that characterized the bouwteam.
P < 0.0001	0.008	0	13	It was often unclear who raised a change, when, and why.
P < 0.0001	0.186	0	36	Setting clear moments to freeze the design would help create structure for the transition to realization.
P < 0.0001	0.526	1	4	Decisions about scope changes were often made by whoever happened to be most involved, rather than by the formally responsible party.
P < 0.0001	0.783	1	29	Not all bouwteam results are formally included in the realization contract; some are deliberately left out to keep flexibility or limit risk.
P < 0.0001	0.843	1	28	At the transition from bouwteam to realization, client and contractor interests diverge: the client seeks certainty, while the contractor resists liability for incomplete bouwteam results.
P < 0.0001	0.875	1	25	When it is unclear who initiated a change during the bouwteam, or when and why, it becomes difficult to determine responsibilities later on.
P < 0.0001	0.916	2	27	Implementation of bouwteam scope changes often starts before formal approval, making them hard to trace after transition.
P < 0.0001	1.099	2	20	Cost pressures often influenced how scope changes were framed or justified.
P < 0.0001	1.218	3	2	Scope change discussions often mixed technical, financial and planning issues, making it unclear what the decision was really about.
P < 0.0001	2.593	4	37	Effective scope change tools depend more on behavioral discipline and ownership than on new software.

Framework Development and Supporting Artefacts

G.1. Initial Framework Draft and Expert Review

Figure G.1 presents the first draft of the governance process framework developed in this research. This draft included the initial design of the decision-anchoring record following a Level 2 traceability classification, while the Level 1 contextual record already largely reflected its final form.

The draft framework was reviewed by an external expert with extensive experience in bouwteam projects. This review identified several operational and practical shortcomings, particularly with respect to the framework's applicability and proportionality in day-to-day project practice.

The identified issues and the corresponding refinements are summarised in Table G.1. Incorporating these refinements resulted in the final version of the framework, which is presented and discussed in Chapter 8.

Table G.1: Identified problems and corresponding framework refinements

Problem	Refinement
Potentially direction-giving points are identified too late, causing important assumptions to be overlooked.	During the meeting, a running list of potentially direction-giving points is maintained.
There is no explicit moment to check whether all relevant points have been identified.	At the end of the meeting, the team briefly reviews the list to check whether points are missing or can be removed.
The Layer-1 question is interpreted inconsistently by different participants.	Example questions are added to Layer 1 (not to Layer 2) to support consistent application.
It is unclear whether Level 0 results from a deliberate assessment after Layer 2 or from the absence of review.	When Level 0 is deliberately chosen after applying Layer 2, this is briefly noted, without prescribing a specific format.
Decision records contain too much detail and are too burdensome in practice.	Documentation is deliberately simplified to a short, proportional set of core elements.
The relationship between decisions and their technical basis remains implicit.	Level 1 and Level 2 records include a reference to technical underpinning (<i>Referenced technical underpinning, if applicable</i>).
The framework was implicitly framed as applicable only at the end of bouwteam meetings.	The framework is applied at the end of a bouwteam meeting or at another explicit alignment moment.

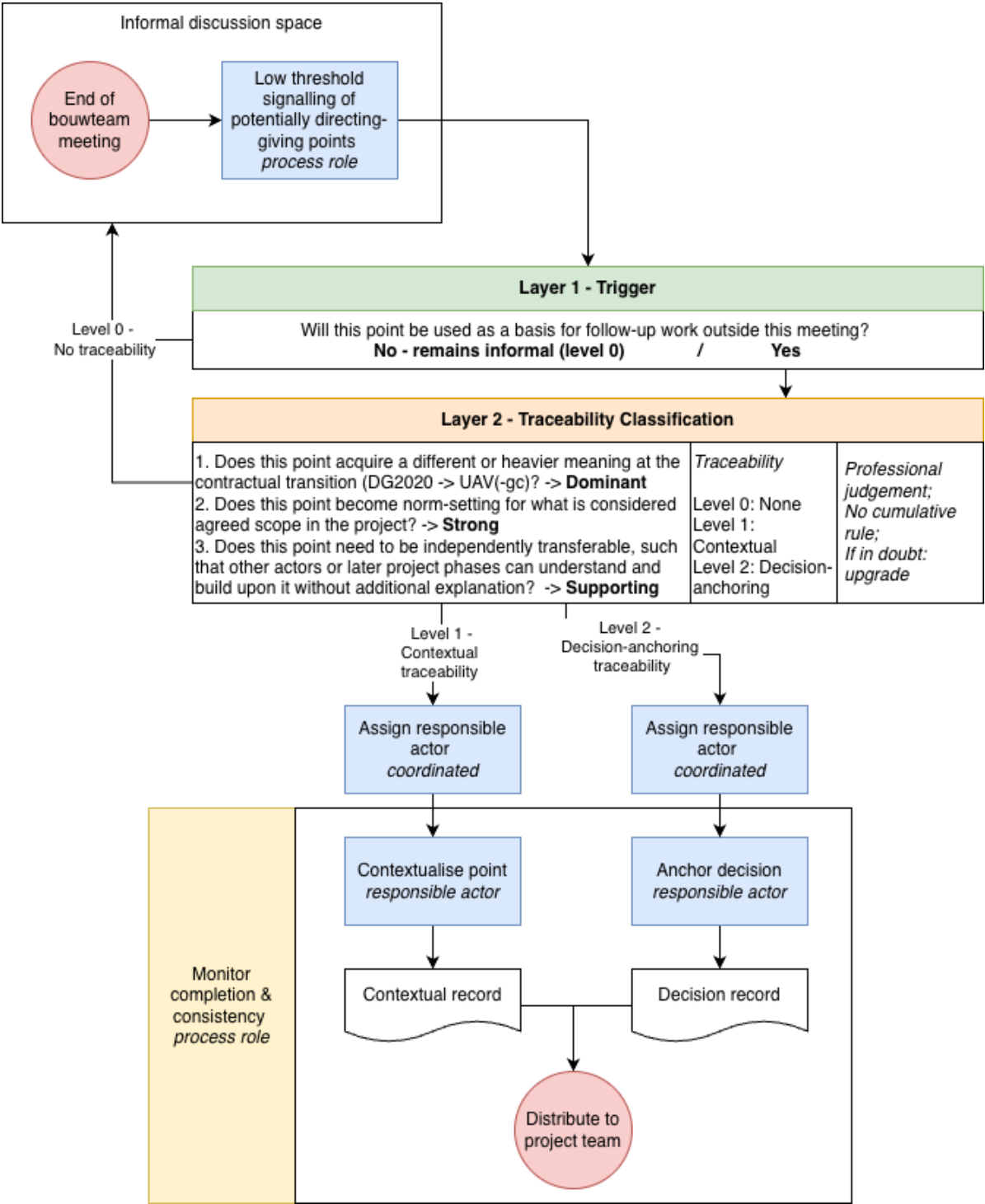


Figure G.1: First draft governance process framework

<i>Decision-anchoring record first draft</i>		
	Element	Explanation or specification
Point details	Point identifier	Short title
	Date of discussion	dd/mm/yyyy
	Meeting ID	Meeting description (bouwteam meeting/alignment moment/etc.) & people present
	Responsible actor	Name + role
Descriptive data	Decision statement	Brief description of decision
	Affected scope elements	Exhaustive search and description of affected scope elements
	Normative character	Wat is now considered "agreed"?
Rationale and considerations	Rationale	-
	Considerations	-
	Rejected alternatives	-
	Reasons for rejection	Reasoning for rejection per alternative
	TOM's	Key trade-offs
Assumptions & reservations	Explicit assumptions	-
	Known uncertainties	-
	Dependencies on future information	-
	Conditions for revision	Possible future conditions under which the decision may need revision
Governance & roles	Parties involved in the decision	Only directly involved parties
	Mandate / authority basis	Who had the final authority of the decision
	Level of agreement or dissent	Ratio [agree vs dissent]
	Escalation history	-
Contractual and legal	Relevance for contractual transition	DG2020 -> UAV / UAV-gc
	Allocation of responsibilities	-
	Allocation of risks	-
	Potential liability implications	-
Implementation and follow-up	Consequences for follow-up work	Exhaustive description of work per affected element of the scope
	Interfaces with other decisions	-
	Required actions	-
	Responsible actor per action	-

Figure G.2: Draft of the decision-anchoring record

G.1.1. Second Framework Iteration and Academic Feedback

Following the first expert review and the subsequent refinements, the framework was presented during a greenlight meeting for academic feedback. This second review did not question the conceptual logic of the framework, but focused primarily on clarity, accessibility, and proportionality in presentation. The feedback indicated that, although the structure was coherent, the visual and textual density of the framework created cognitive overload. As a result, its practical usability risked being undermined by unnecessary complexity.

In response to this feedback, a second refinement cycle was undertaken. The core structure of the framework—comprising the informal discussion space, Layer 1 trigger, Layer 2 classification, and differentiated records—remained intact. However, terminology was simplified, visual elements were reduced, and explanatory density was decreased to enhance readability. The term *Decision-Anchoring Record* was renamed to *Reference Record* in order to reduce perceived legal connotations and improve intuitive understanding.

The identified issues and corresponding refinements are summarised in Table G.2.

Table G.2: Identified issues and refinements after academic feedback

Identified issue	Refinement
The framework was perceived as overly complex and cognitively demanding at first glance.	Visual simplification of Layer 1 and Layer 2 structure; reduction of explanatory text within the diagram.
Information density within Layer 2 created confusion about how classification should be applied.	Layer 2 classification logic was visually and textually simplified to reduce cognitive overload and improve usability during live application.
The distinction between contextual and decision-anchoring traceability was not immediately intuitive.	Terminology refined to clarify functional differences; emphasis placed on governance effect rather than document type.
The term “Decision-Anchoring Record” suggested strong legal fixation and formal rigidity.	Renamed to “Reference Record” to emphasise its function as a stable point of reliance rather than a legal instrument.

G.2. Final Traceability Records
Level 1 - Contextual Record

Contextual record		
Element		Explanation
Point details	Point identifier	Short title
	Date of discussion	dd/mm/yyyy
	Meeting ID	Meeting description (bouwteam meeting/alignment moment/etc.) & people present
	Responsible actor	Name + role
Contextual data	Description	Brief description of direction-giving point
	Rationale and consideration	Why?
		What was considered?
		What alternatives were deliberately not developed?
	Assumptions & uncertainties	Explicit assumptions
		Known uncertainties
	Referenced technical underpinning (if applicable)	eg. calculation, technical note, TOM, sketch, report

Figure G.3: Contextual record

Level 2 - Reference Record

Reference record		
	Element	Explanation or specification
Point details	Point identifier	Short title
	Date of discussion	dd/mm/yyyy
	Meeting ID	Meeting description (bouwteam meeting/alignment moment/etc.) & people present
	Responsible actor	Name + role
Descriptive data	Decision statement	Brief description of decision
	Affected scope elements	Scope elements to which this decision applies directly
	Normative scope	Wat is now considered "agreed"?
Assumptions	Explicit assumptions & limitations affecting validity	-
Governance & roles	Mandate / authority basis	Who had the final authority of the decision
Contractual and legal	Relevance for contractual transition	What changes when DG2020 -> UAV / UAV-gc?
Referenced technical underpinning	eg. Calculation, technical note, TOM, sketch, report	Only if applicable

Figure G.4: Reference record

G.3. Illustrative Applications of the Governance Framework

The following table provides illustrative examples showing how one topic discussed in a bouwteam setting can lead to different commitment classifications when the framework is applied. The examples are intentionally simplified. Their purpose is not to prescribe correct decisions, but to demonstrate how informal coordination can function in different ways depending on how the item is used in subsequent work.

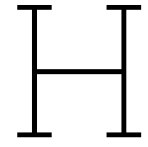
Illustrative topic

For consistency, all examples refer to the same topic: a preliminary underground pipeline alignment developed on the basis of available as-built drawings and asset data. The examples show how the same topic can remain informal, function as a contextual commitment, or become a cross-phase commitment depending on how it is relied upon in later design and decision-making.

Table G.3: Illustrative application of the governance framework to a single topic across different situations

Illustrative item	Layer 1 assessment	Layer 2 considerations	Commitment classification	Explanation
During a technical discussion it is mentioned that the available as-built drawings of the underground pipeline may not fully match the actual situation on site.	The item is noted on the running list but is not considered direction-giving.	Not applicable.	Not assessed (remains informal).	The remark is exploratory and does not guide follow-up work. It stays within the informal discussion space.

Illustrative item	Layer 1 assessment	Layer 2 considerations	Commitment classification	Explanation
The preliminary pipeline alignment is mentioned during the meeting, but no further work is based on it.	When reviewing the approved list, the Layer 1 question is answered negatively.	Not applicable.	Level 0 — Provisional working input.	Although discussed, the alignment is not used as a basis for later work. It remains explicitly provisional and informal.
The preliminary alignment is temporarily used in early coordination while waiting for site verification.	The item is considered direction-giving because it is used as input for ongoing work.	The alignment guides work, but alternatives remain open and it is not expected to function as a stable reference beyond the bouwteam phase.	Level 0 — Provisional working input (after Layer 2).	The item influences work but is clearly provisional. It does not yet function as a commitment that needs to be preserved beyond the current context.
The assumed pipeline alignment becomes the shared reference for multidisciplinary coordination within the bouwteam.	The item is direction-giving because several disciplines rely on it.	The alignment narrows alternatives and guides further work within the bouwteam phase, but is not yet intended as a stable cross-phase reference.	Level 1 — Contextual commitment.	A contextual record is created to capture the alignment, its assumptions, and limitations. The record supports clarity within the bouwteam context.
A confirmed deviation between recorded and actual pipeline locations is accepted as the fixed basis for redesign and further project development.	The item clearly directs subsequent work.	The deviation functions as a stable reference for further decisions, must be independently understandable, and is expected to be relied upon in later project phases.	Level 2 — Cross-phase commitment.	A reference record is established to stabilise the decision and ensure it can be reliably used beyond the bouwteam phase.



Acknowledgment of AI Use

During the preparation and writing of this thesis, AI tools were utilised to support the research process in several ways:

- Brainstorming and rewriting
AI was used to brainstorm ideas, restructure sections, and rephrase sentences to improve clarity, academic tone, and overall readability. This included suggestions for sentence structure, formulation of definitions, and paragraph coherence.
- Summarizing transcripts
AI was used to extract main themes from extensive transcribed interviews with respondents that participated in the Q-methodology research method. A critical review of AI output resulted in a coherent summary per interview that closely corresponds with the actual conversation.
- LaTeX coding assistance
AI was used to support the development of LaTeX code for tables, figures, bibliography formatting, and layout structuring to ensure consistency and efficiency in document preparation.
- Formatting references and BibTeX entries
AI was used to convert reference details into BibTeX format for direct integration into Overleaf, ensuring correct citation formatting and database consistency.

It is important to emphasise that all research data, analyses, insights, and sources were self-generated and self-found by the author. The AI tools were only used as supportive writing and formatting assistants and outputs were ever critically assessed before implementation in the report. The academic responsibility for all content, argumentation, and conclusions presented in this thesis rests solely with the author.