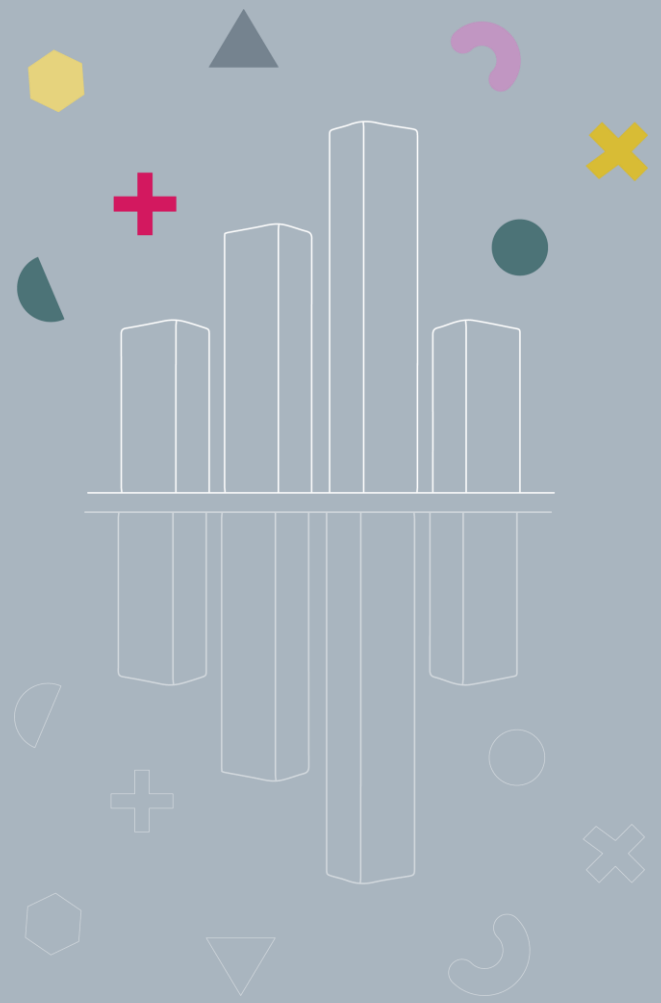
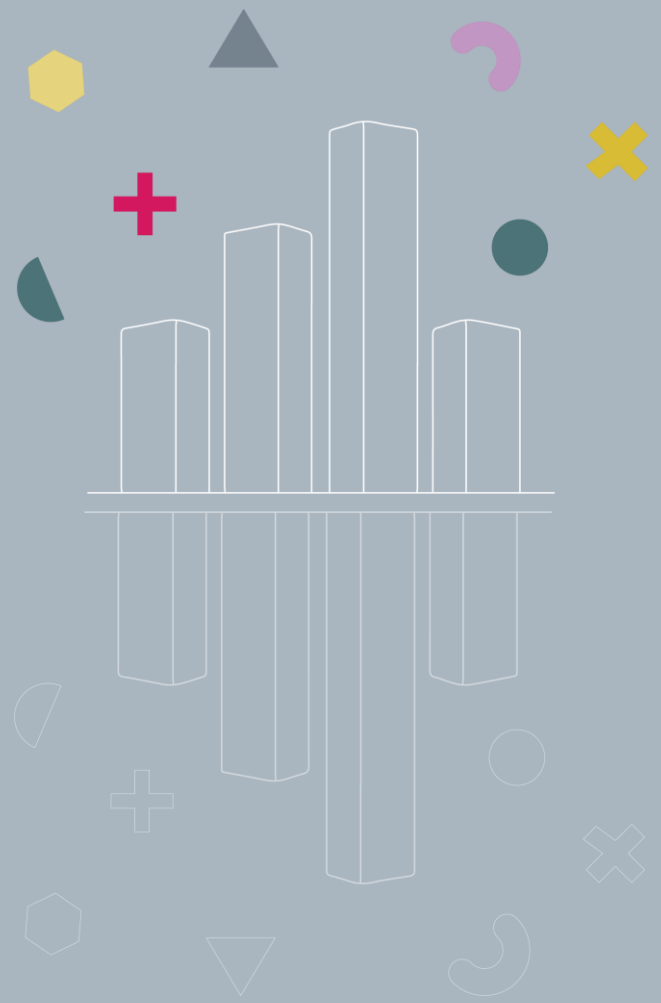


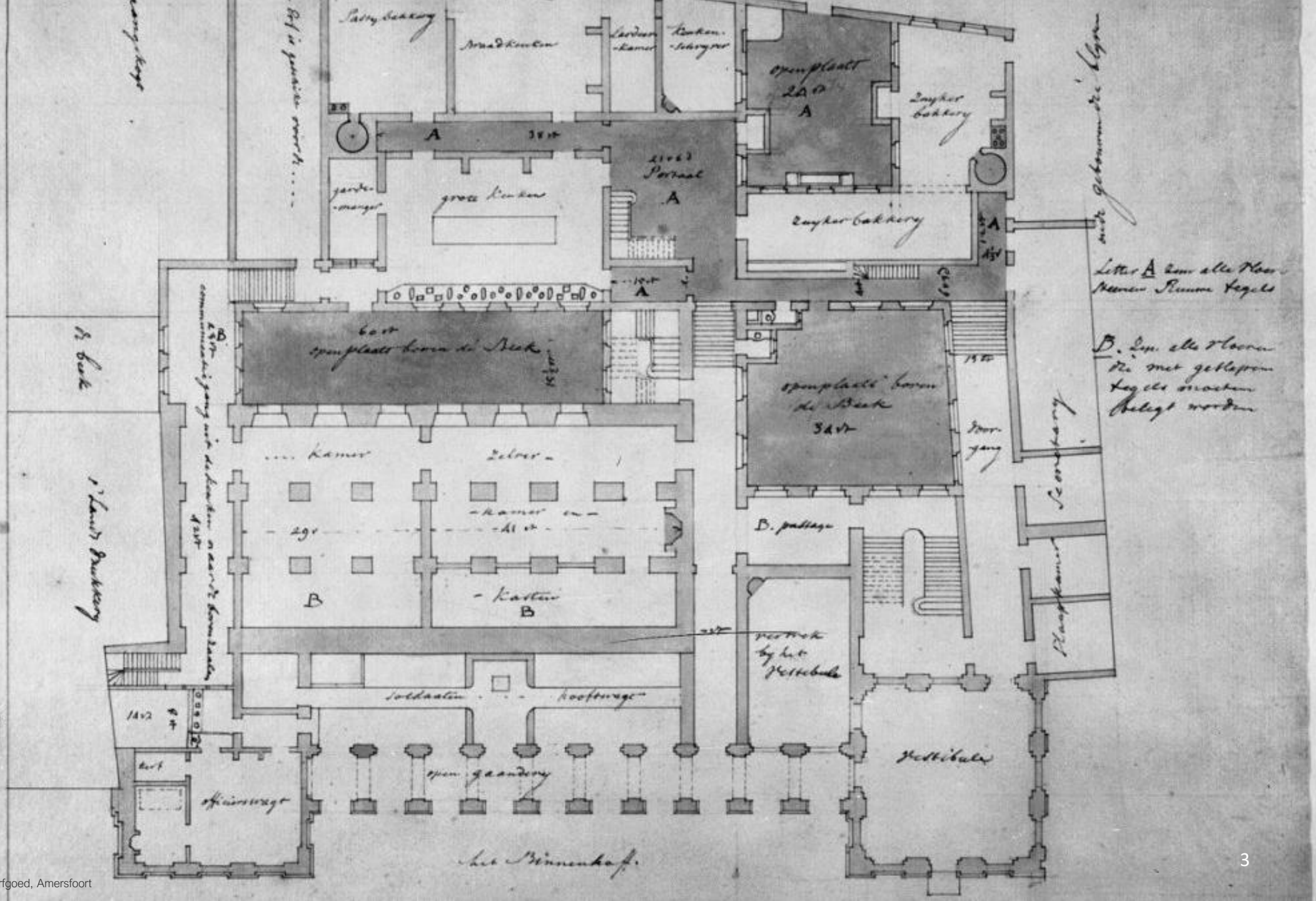
P5 Presentation

Ilse van Milaan | 4445740

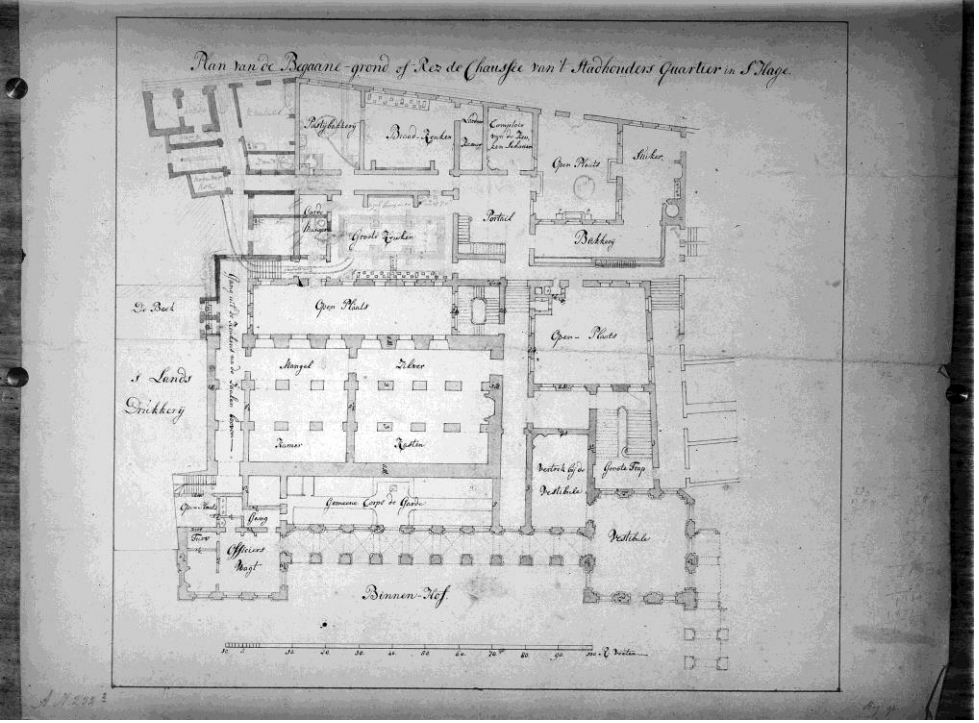


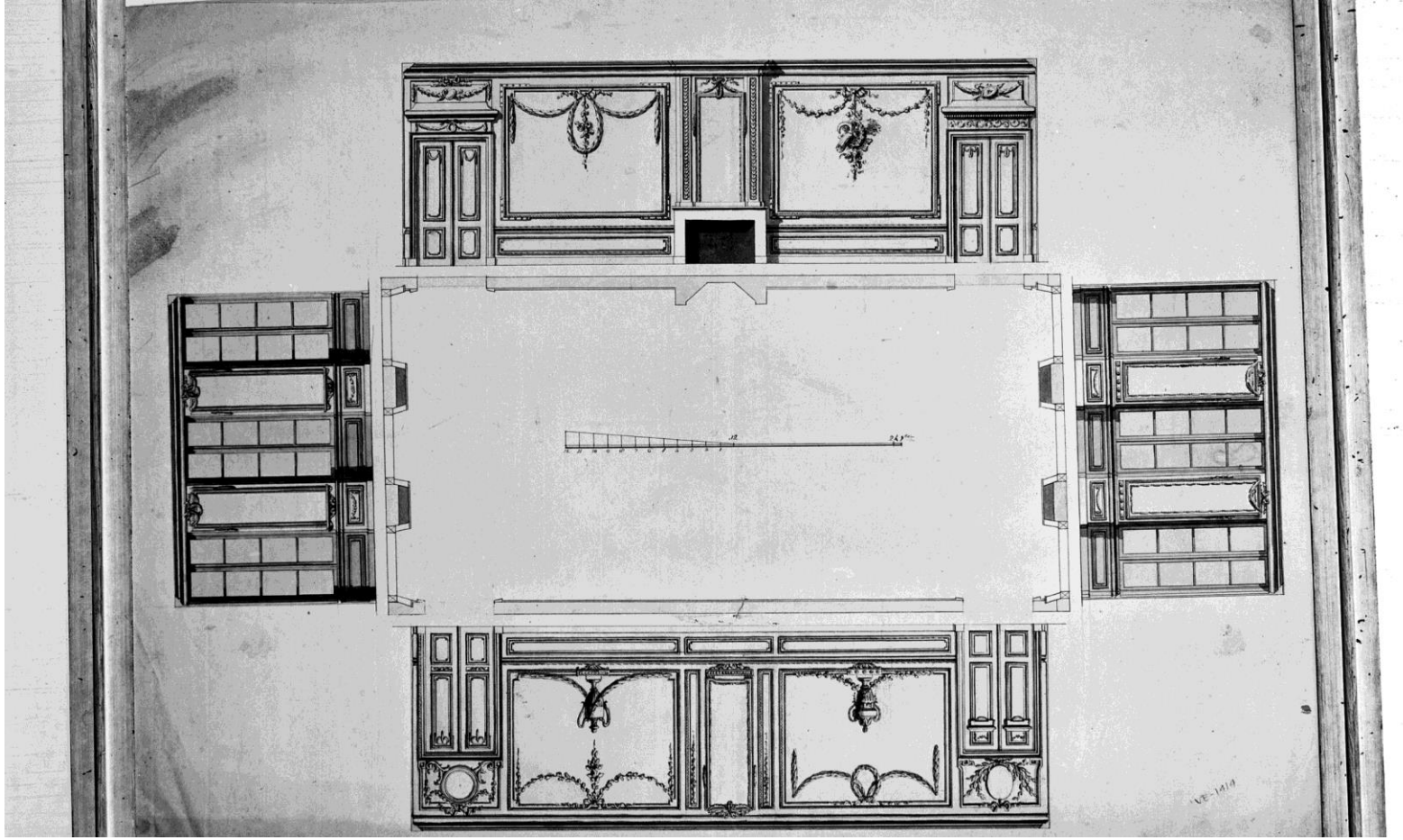
P5 Presentation

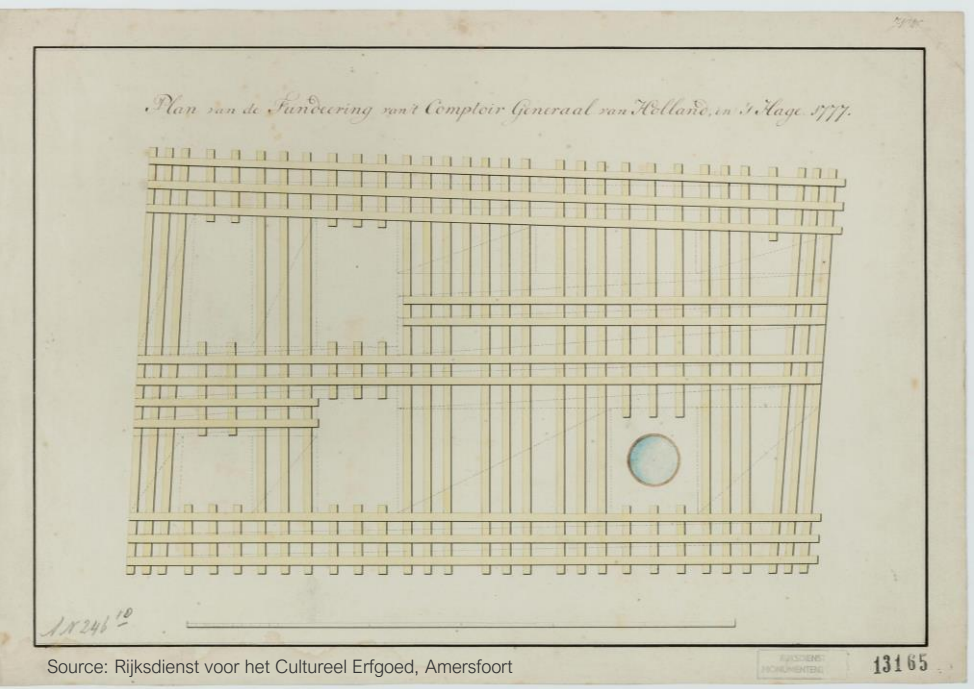
Ilse van Milaan | 4445740



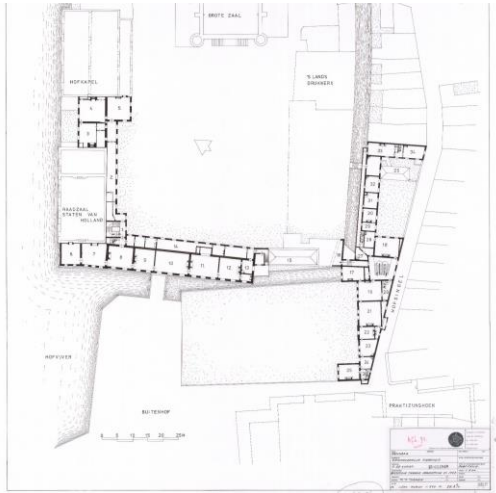
Source: Rijksdienst voor het Cultureel Erfgoed, Amersfoort

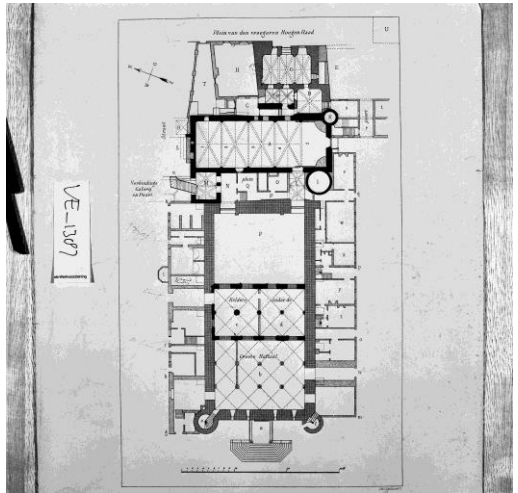


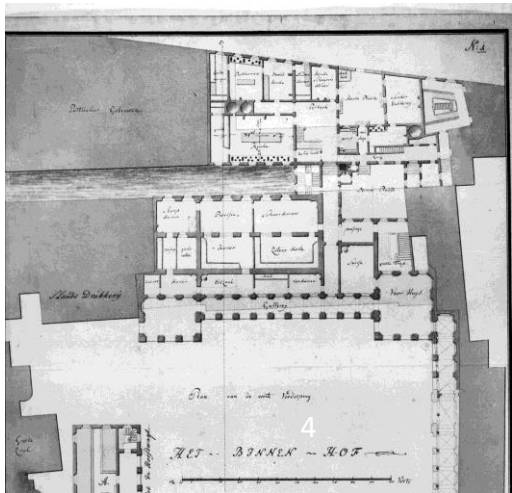


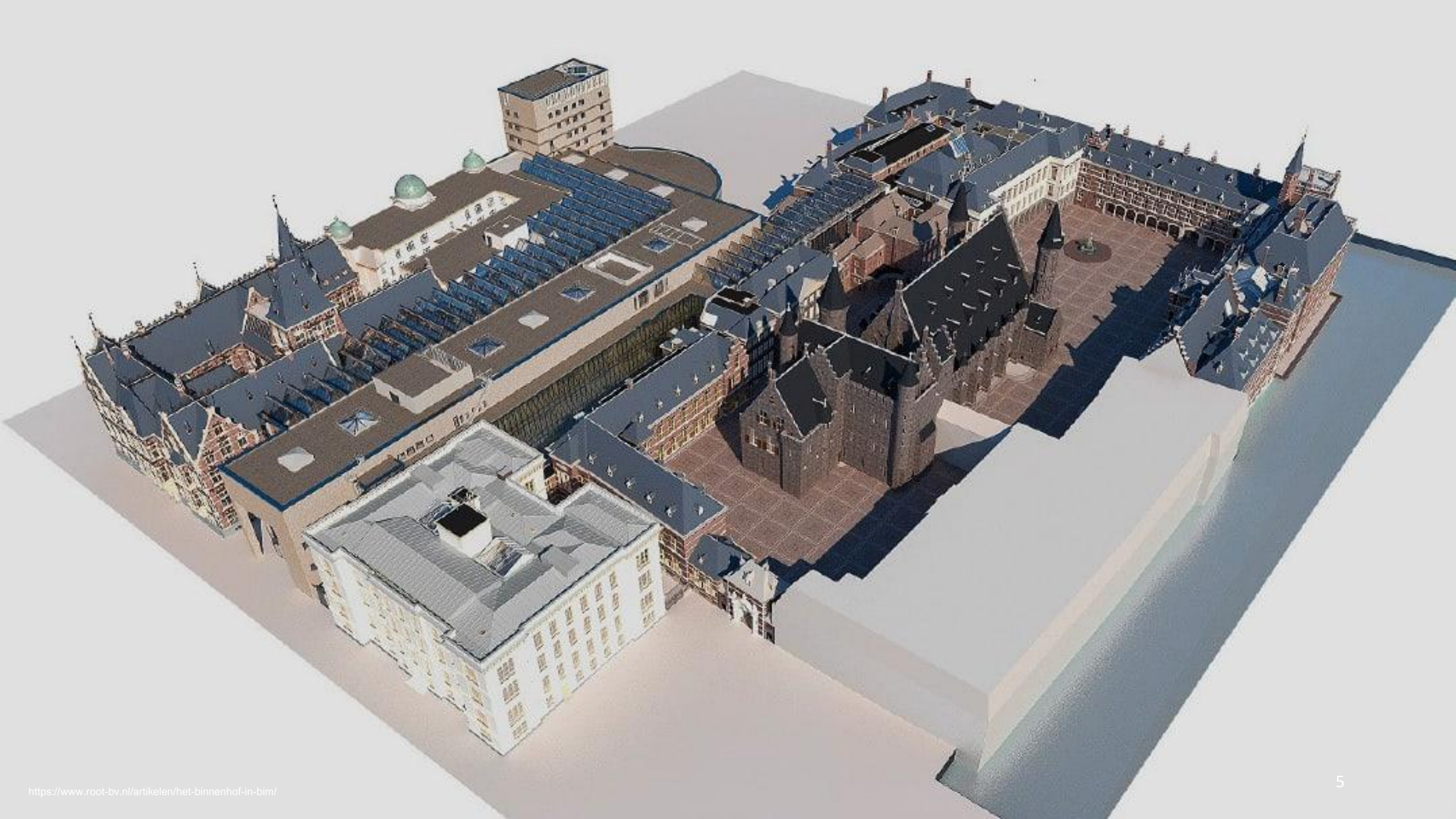


Source: Rijksdienst voor het Cultureel Erfgoed, Amersfoort









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https://www.root-bv.nl/artikelen/het-binnenhof-in-bim/

From BIM to digital twins: towards a successful data exchange through public procurement

a case study research within the Dutch building industry

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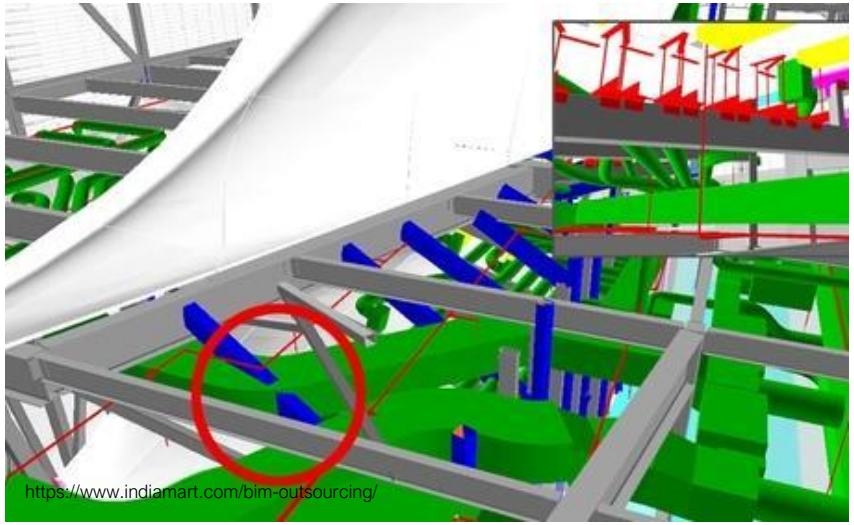
BIM

1. **Building Information Model**: digital representation of a building

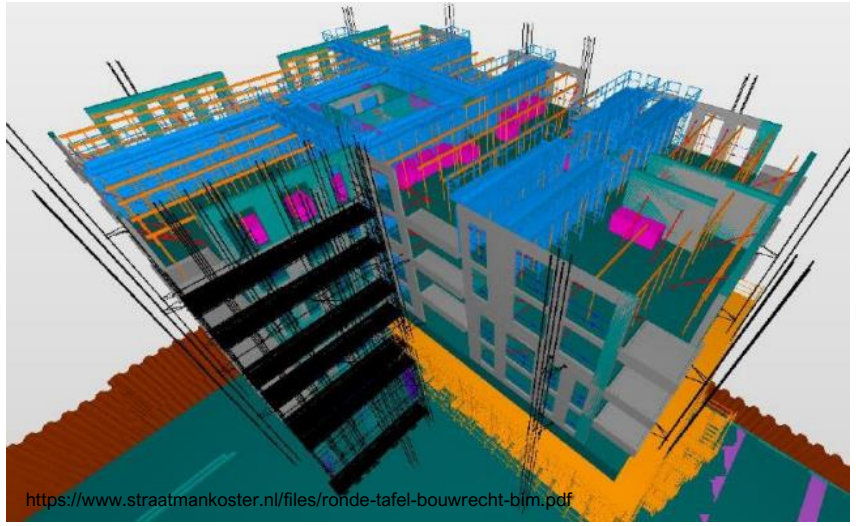
2. **Building Information Modelling**: the process of digital modelling and cooperation between parties

3. **Building Information Management**: the management and (re)use of digital building information in the entire life cycle of the building.

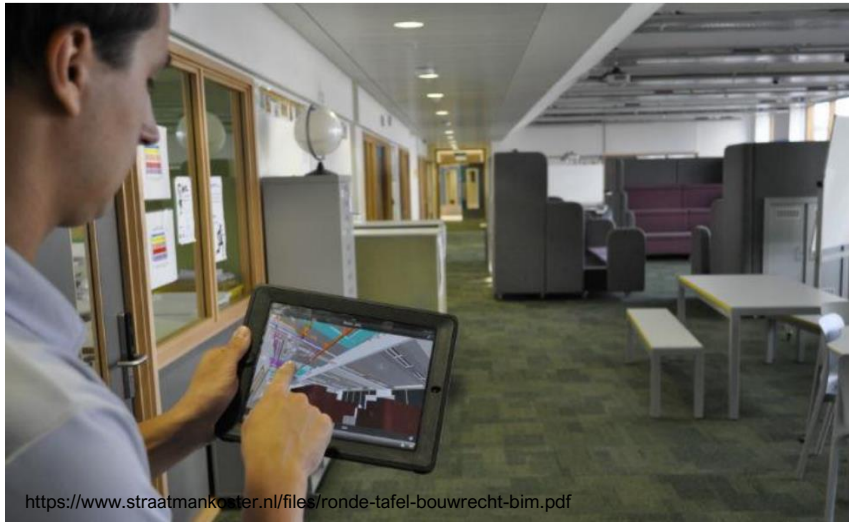
Design



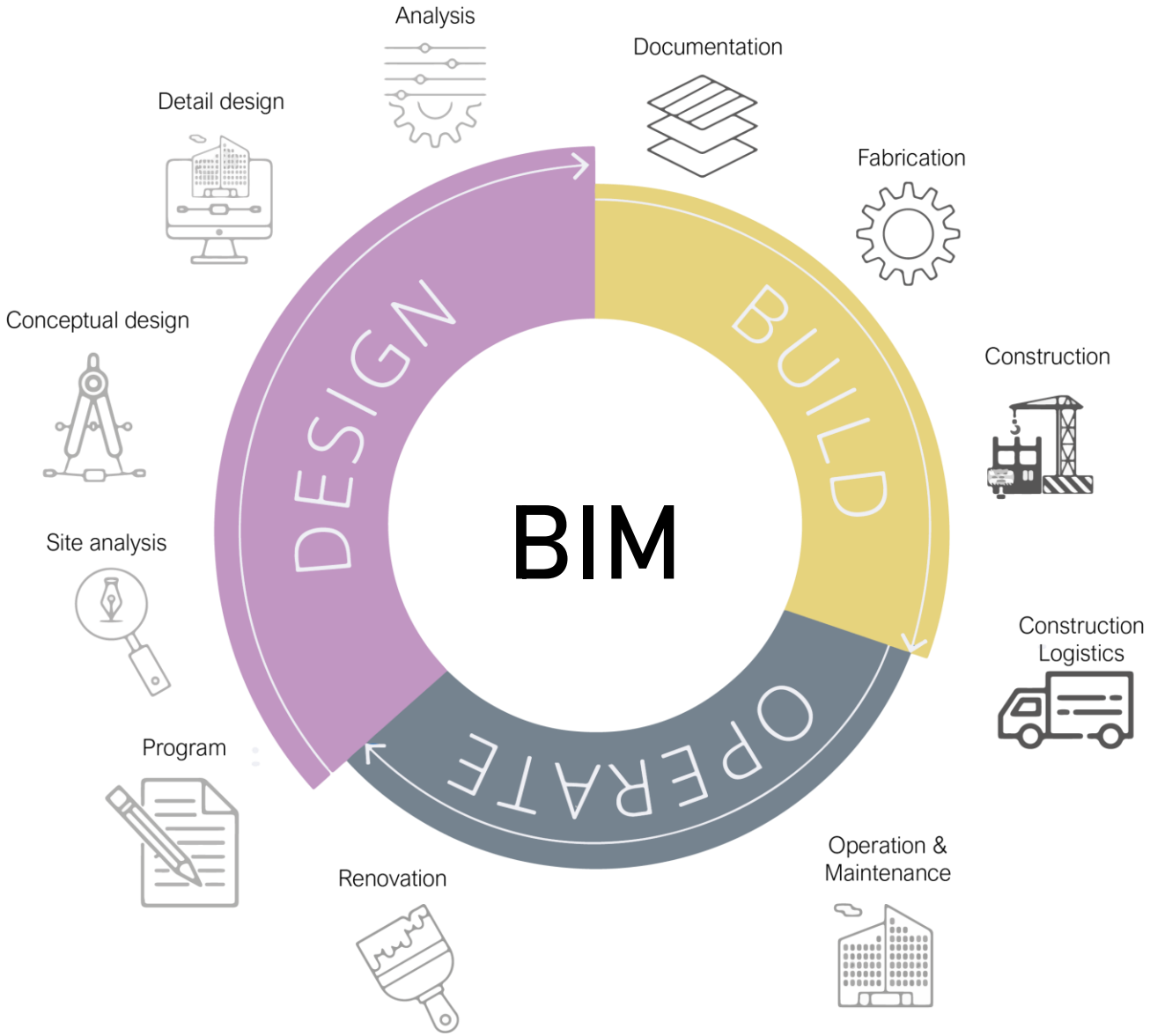
Clash detection



Construction

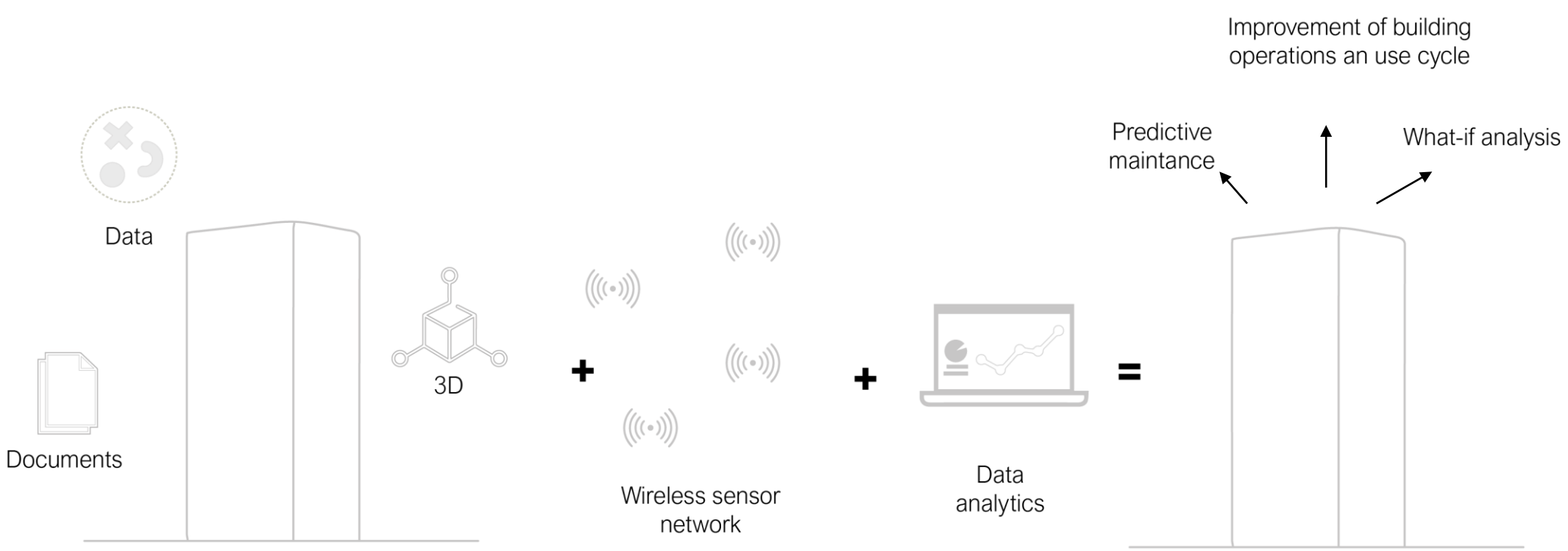


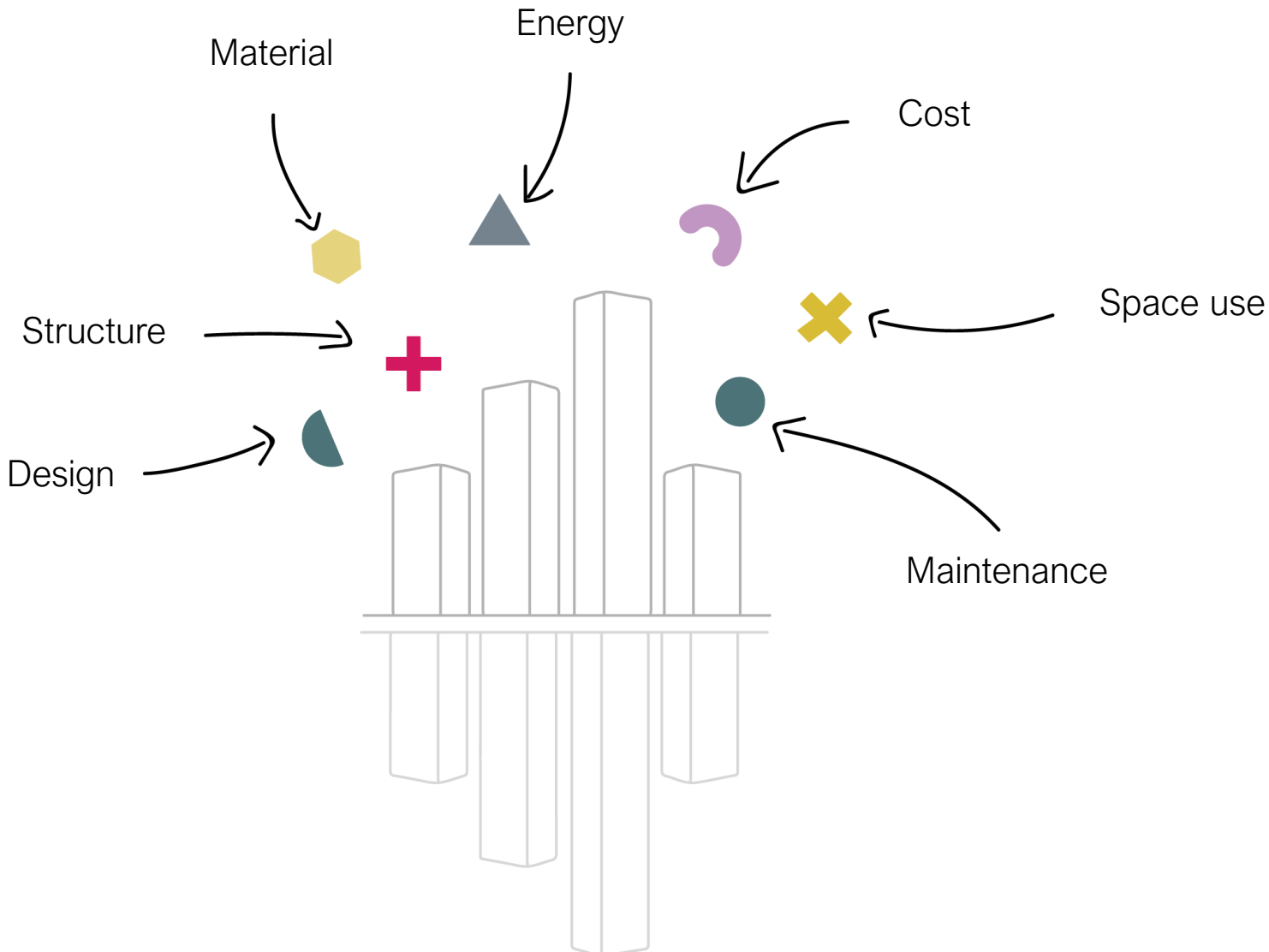
Operation and maintenance

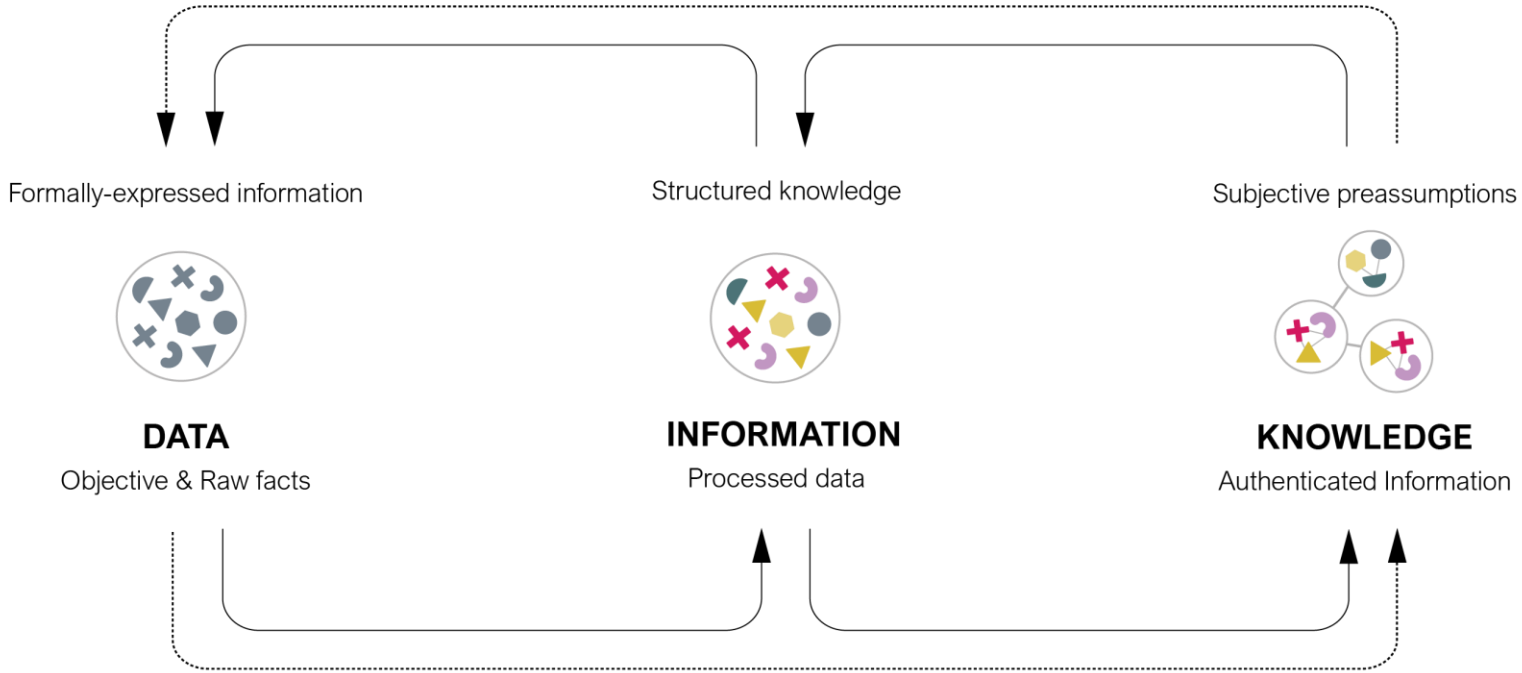

Analysis
Documentation
Detail design
Fabrication
Conceptual design
Construction
DESIGN
BUILD
BIM
Site analysis
Construction Logistics
OPERATE
Program
Operation & Maintenance
Renovation

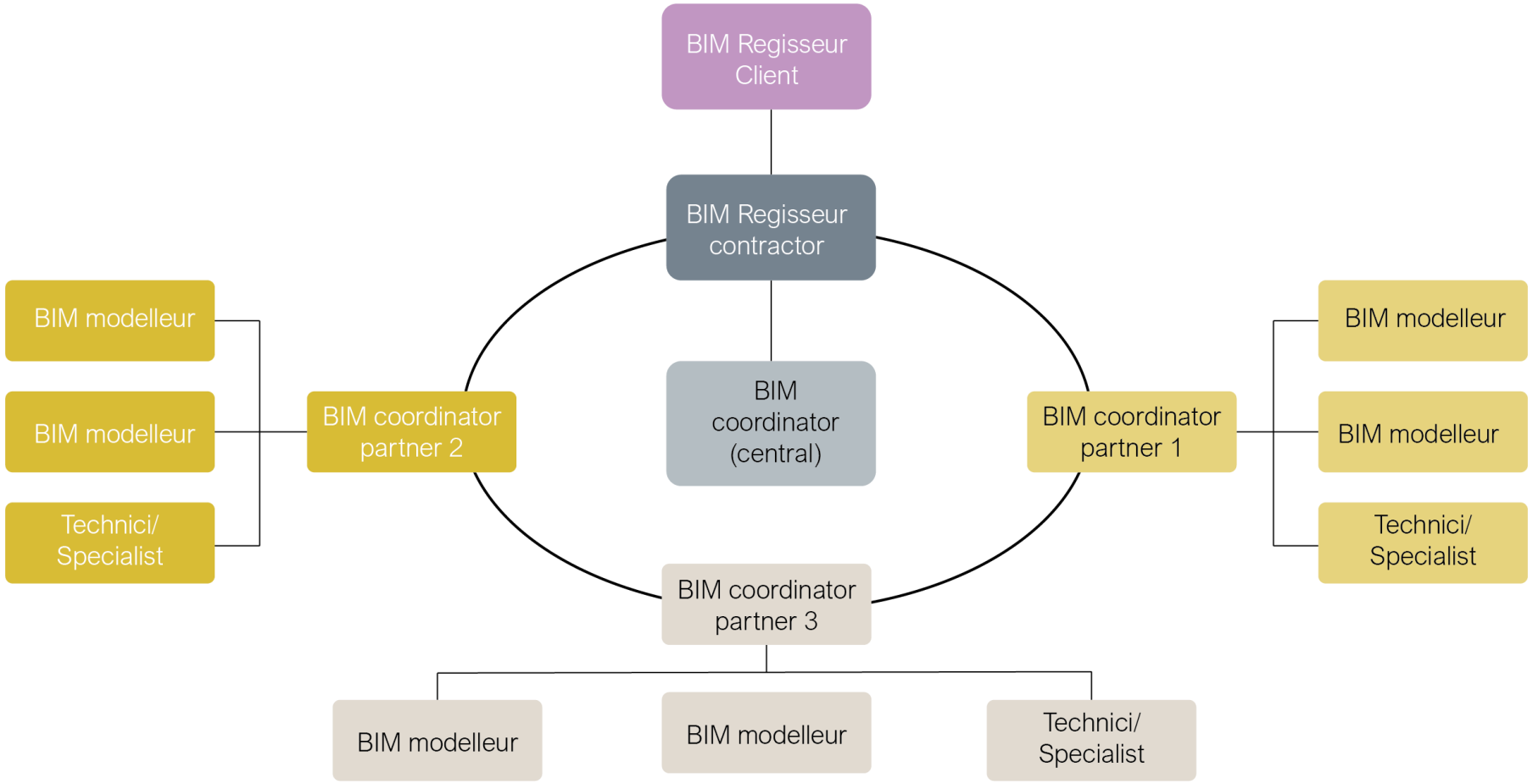
BIM

Digital twin




Material
Energy
Cost
Structure
Space use
Design
Maintenance


Formally-expressed information
Structured knowledge
Subjective preassumptions
DATA
Objective & Raw facts
INFORMATION
Processed data
KNOWLEDGE
Authenticated Information


BIM Regisseur Client
BIM Regisseur contractor
BIM modelleur
BIM modelleur
Technici/ Specialist
BIM coordinator partner 2
BIM coordinator (central)
BIM coordinator partner 1
BIM modelleur
BIM modelleur
Technici/ Specialist
BIM coordinator partner 3
BIM modelleur
BIM modelleur
Technici/ Specialist

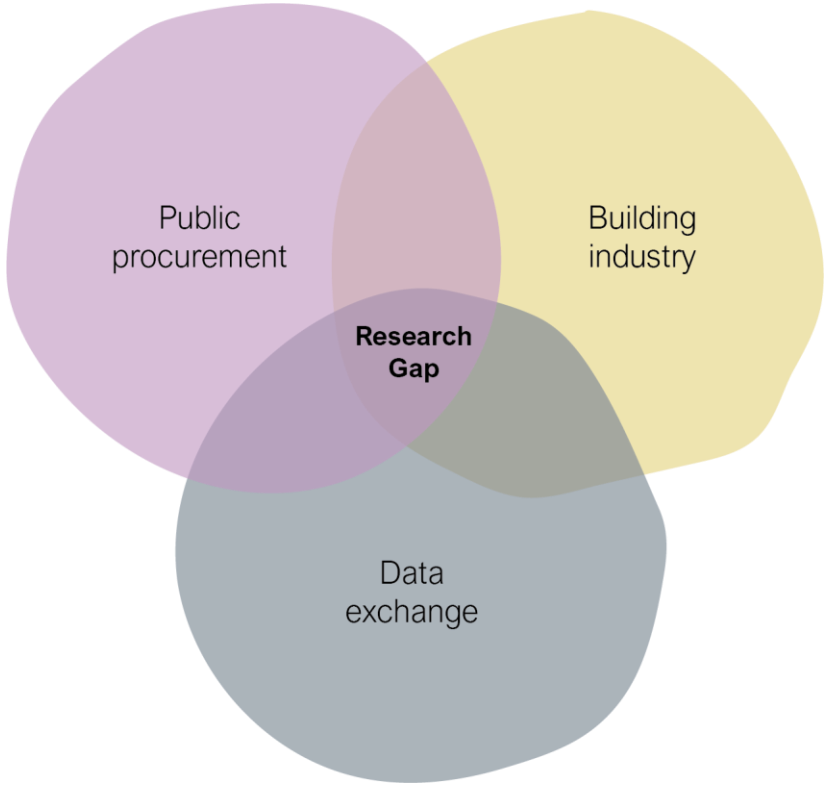
Challenge

- Dealing with the large volumes of data and the changing process necessitates a more **robust and efficient data strategy** than ever before.
- **Procurement documents** will comprise, in addition to the standard documentation for physical construction work, several **new or revised documents or regulations** related to digital construction and data exchange.
- **Best practices and standards** that apply to these new processes and obligations would be beneficial to parties' implementation (Winfield, 2020).

Problem statement

There is **little known** on how the **procurement phases** are used to enhance **successful data exchange in construction projects**

Research gap



Goal

To create value for contracting authorities by providing **advice for the development and improvement of their procurement strategy in relation to data exchange** and contributing knowledge to the academic literature.

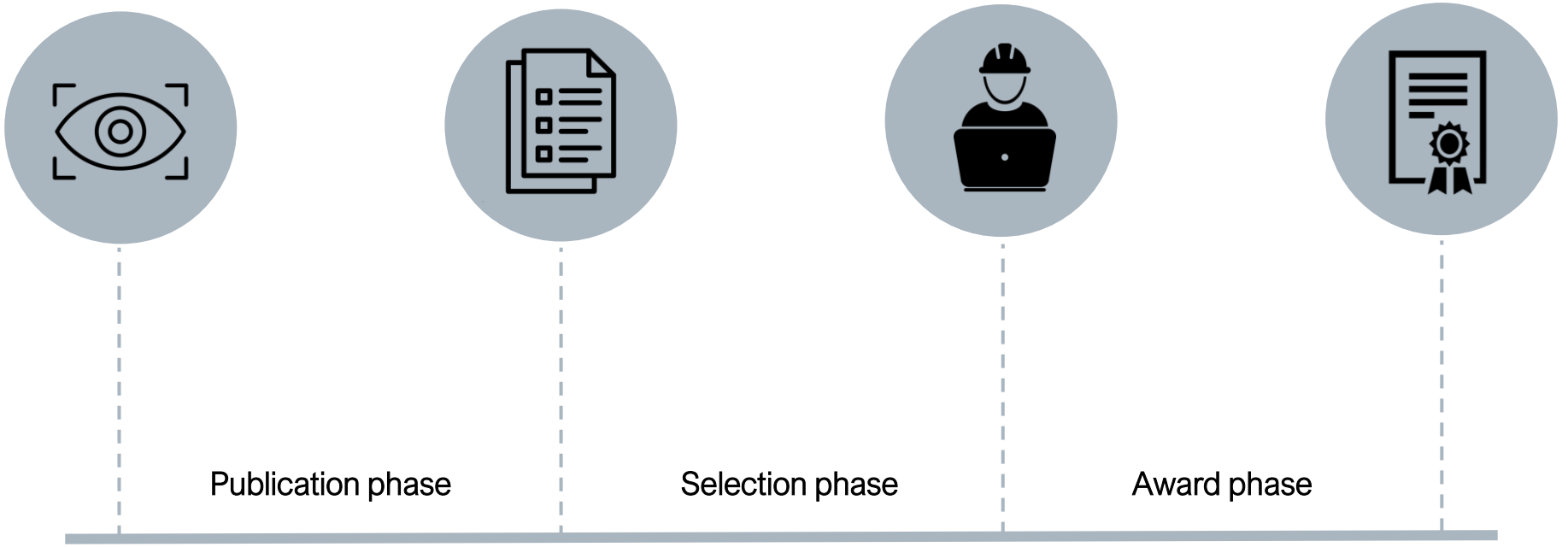
Public Procurement

- Public procurement (*publieke aanbesteding*) is the purchase of products, goods, and services by contracting authorities to meet the requirements and expectations of public administration

- Contracting authorities (*aanbestedende diensten*) are the State, regional, or local governments, bodies controlled by public law

- 2012 Procurement Act (Aanbestedingswet 2012)

Public Procurement

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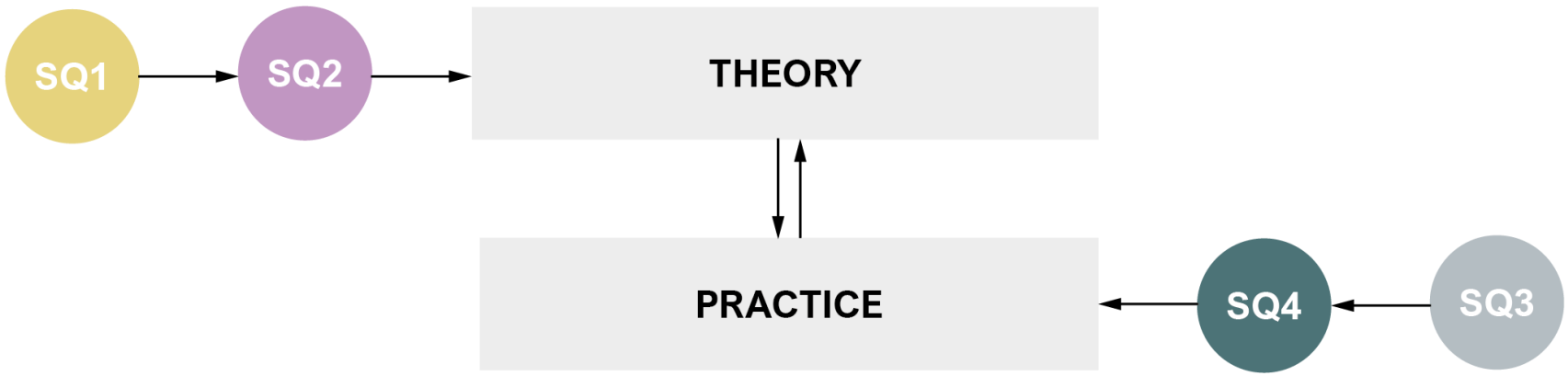
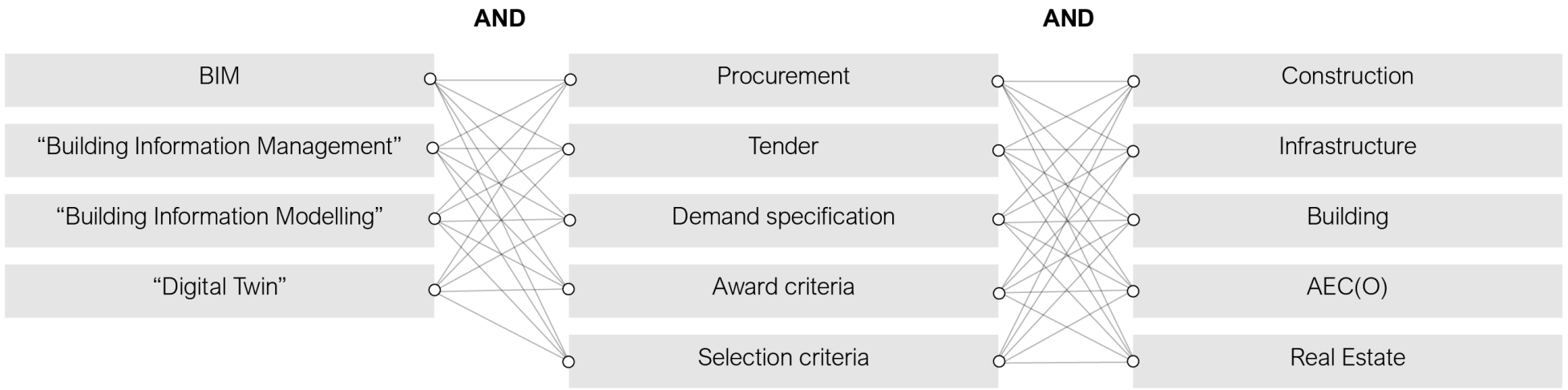
Research question

"How can **contracting authorities** (re)design the **procurement phases** to enhance **successful data exchange in construction projects**?"


SQ1
SQ2
THEORY
PRACTICE
SQ4
SQ3

Literature study



Case study

Case A – Herman Gorter Complex

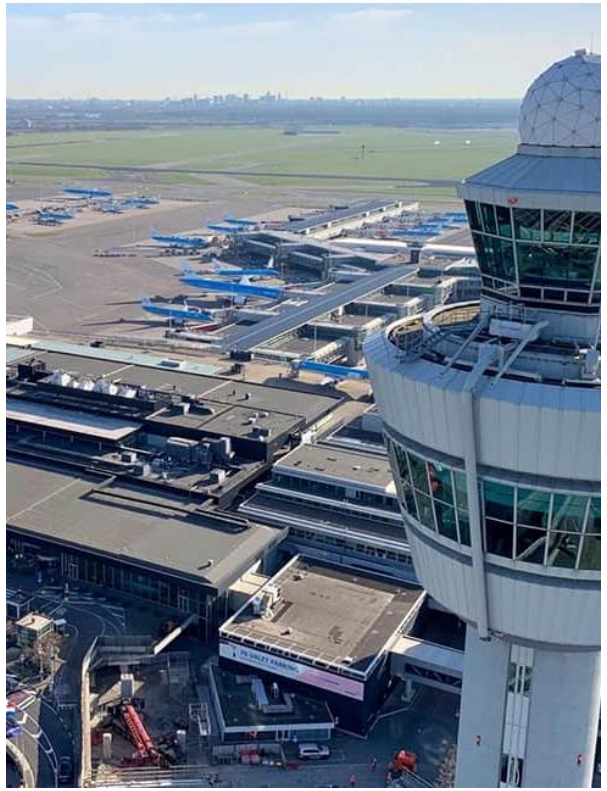
Rijksvastgoedbedrijf

Case B – A12 Ijsselbruggen

Rijkswaterstaat

Case C – E-pier

Schiphol



Case D – A326

Provincie Gelderland

CASE 1

Project manager

Contract manager

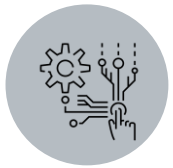
Technical advisor

Tender manager

CASE 2

Project manager

Contract manager

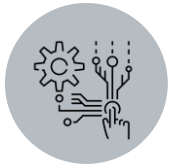


Advisors AIRBIM

Project manager

CASE 3

Project manager



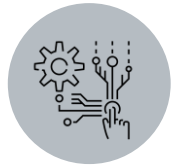
BIM coordinator

Asset manager

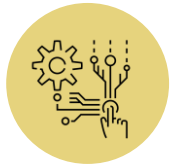
Project manager

BIM coordinator

CASE 4



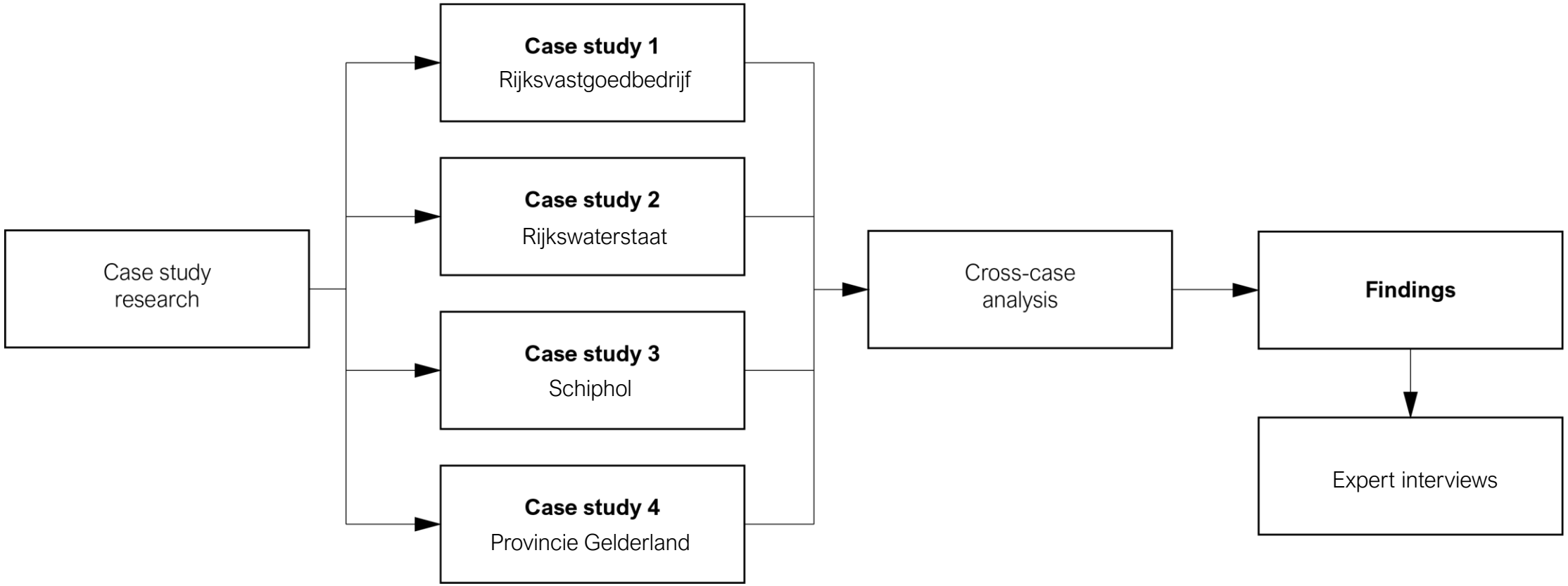
BIM coordinator



BIM coordinator

Client

Contractor


Case study research
Case study 1
Rijksvastgoedbedrijf
Case study 2
Rijkswaterstaat
Case study 3
Schiphol
Case study 4
Provincie Gelderland
Cross-case analysis
Findings
Expert interviews

Validation

Expert interviews

Expert	Company	Role
1	BIM Loket, KPCV	Consultant and researcher
2	Rijksvastgoedbedrijf	Manager
3	TNO, University of Twente	Director and professor

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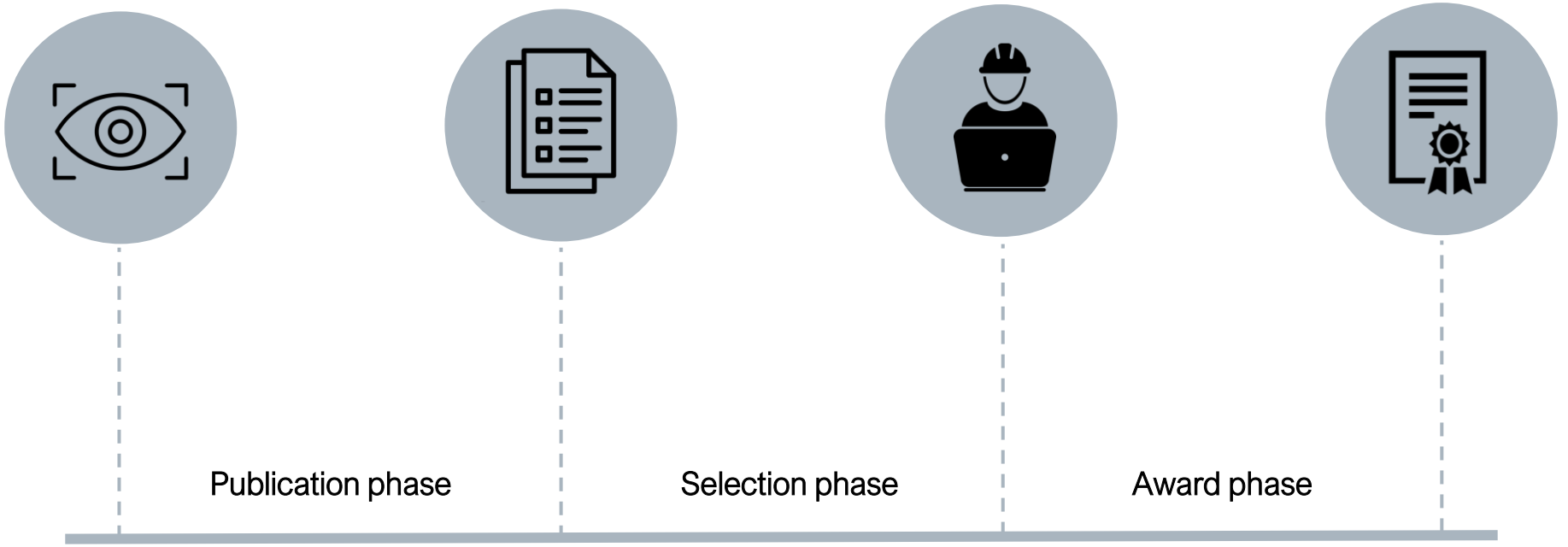
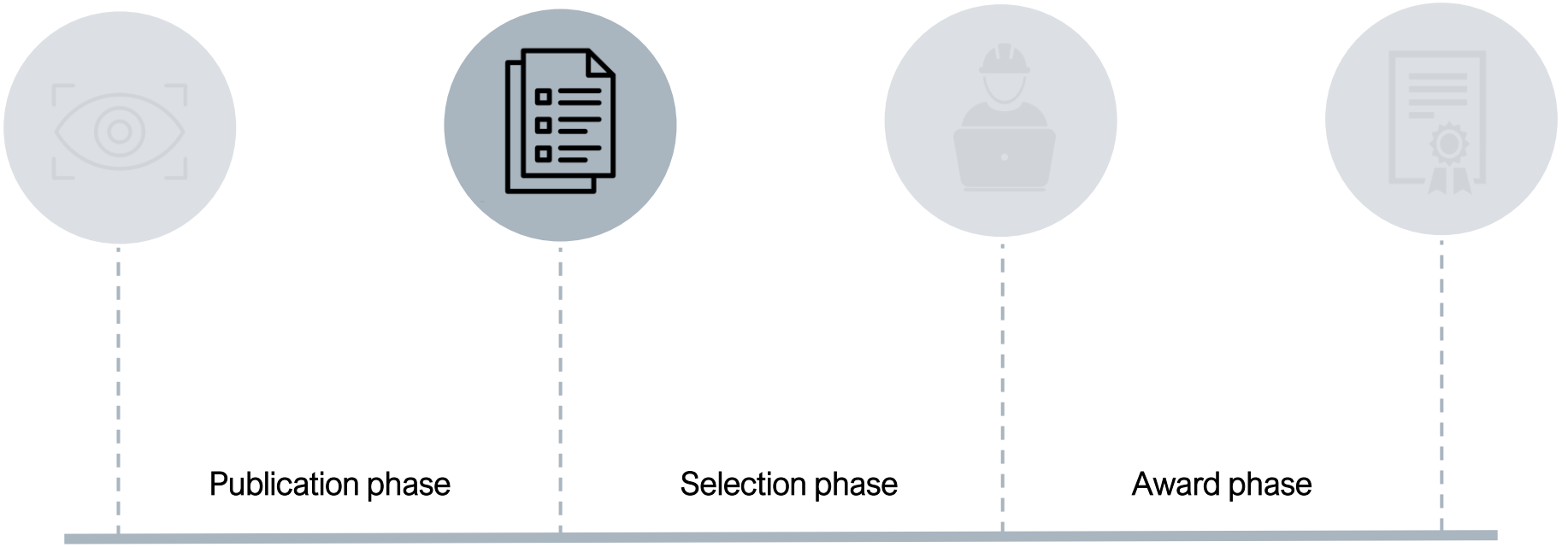
Literature

Public Procurement



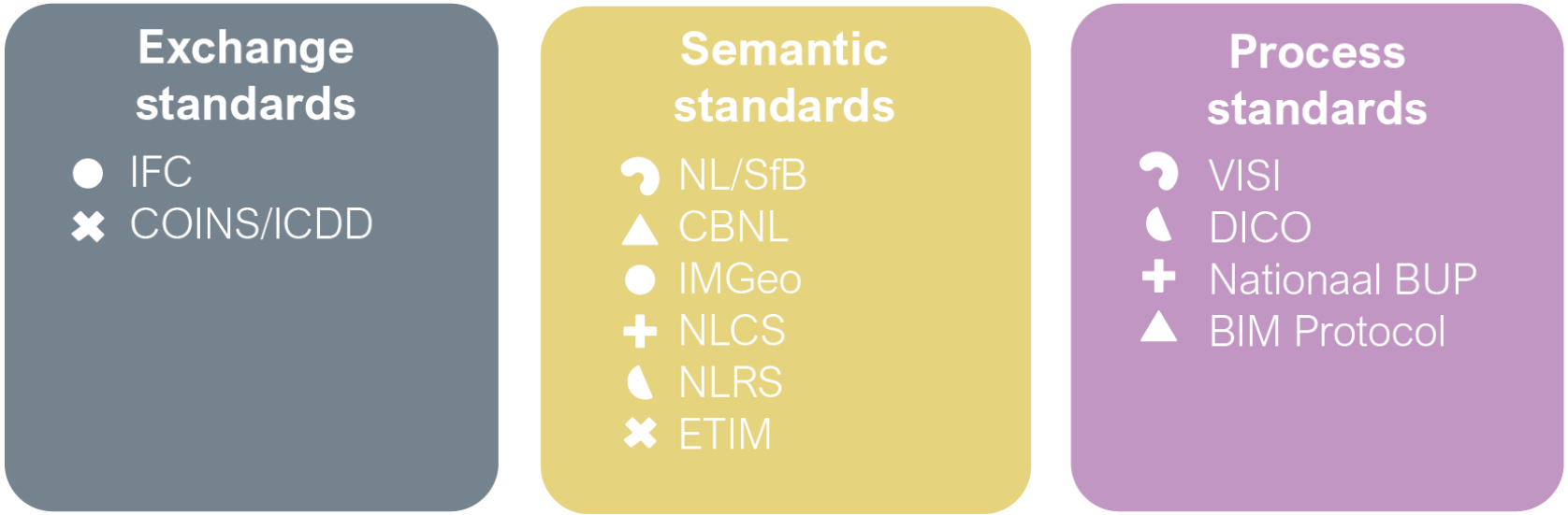
Public Procurement



Information delivery specification

- Project information
- Structure of the project team
- BIM objectives for the project
- Acceptance criteria
- Information production methods and procedures
- Reference information and shared information sources
- Data exchange schedule
- The information standard

Open standards



Semantic standard: NL-SfB

- 21.11: external walls; non-structural, solid walls

NL-SfB code	
Code	Omschrijving
	ALGEMEEN
$1	Algemeen
$2	Kader
$3	Viewports
$4	Onderhoek
$5	Noordpijl
$6	Schaalbalk
$7	Stramien
$8	Hulplijnen
$9	Renvooi
1_	**ONDERBOUW**
10	Onderbouw
11	Bodemvoorzieningen
13	Vloeren op grondslag
16	Funderingskonstructie
17	Paalfundering
19	Onderbouw algemeen
2_	**BOVENBOUW**
20	Bovenbouw
21	Buitenwanden
22	Binnenwanden
23	Vloeren, galerijen
24	Trappen, hellingen
27	Daken
28	Hoofddraagkonstrukties
3_	**AFBOUW**
30	Afbouw
31	Wandopeningen, buiten
32	Wandopeningen, binnen
33	Vloeropeningen
34	Balustrades e.d.
35	Plafonds
37	Dakopeningen
38	Inbouwpakketten anders dan 31 t/m 37
39	Afbouw
4_	**AFWERKINGEN**
40	Afwerkingen
41	Buitenwandafwerkingen
42	Binnenwandafwerkingen
43	Vloerafwerkingen
44	Trap- en hellingafwerkingen
45	Plafondafwerkingen
47	Dakafwerkingen
48	Afwerkingspakketten
49	Afwerking algemeen

5_	**MECHANISCHE INSTALLATIES**
50	Mechanische installaties
51	Warmteopwekkingsinstallaties
52	Rioleringsinstallaties
53	Waterinstallaties
54	Gasinstallaties
55	Koelinstallaties
56	Warmtedistributie-installaties
57	Luchtbehandelingsinstallaties
58	Klimaatregelingsinstallaties
59	Mechanische installaties
6_	**ELECTRISCHE INSTALLATIES**
60	Electrische installaties
61	Centrale elektrotechnische-installaties
62	Krachtstroom installaties
63	Verlichtingsinstallaties
64	Communicatie installaties
65	Beveiliging installaties
66	Transport installaties
69	Electrische installaties algemeen
7_	**VASTE INRICHTINGEN**
70	Vaste inrichtingen
71	Vaste verkeersvoorzieningen
72	Vaste gebruikersvoorzieningen
73	Vaste keukenvoorzieningen
74	Vaste sanitaire voorzieningen
75	Vaste onderhoudsvoorzieningen
76	Vaste opslagvoorzieningen
79	Vaste inrichtingen
8_	**LOSSE INVENTARIS**
80	Losse inrichting
81	Losse inventaris voor verkeersruimten
82	Losse inventaris voor gebruiksruimten
83	Losse keuken inventaris
84	Losse sanitaire inventaris
85	Losse schoonmaakinventaris
86	Losse opberginventaris
89	Losse inventaris
9_	**TERREIN**
90	Terrein
91	Grondvoorzieningen
92	Opstallen
93	Omheiningen
94	Terreinafwerkingen
95	Terreininstallaties, werktuigkundig
96	Terreininstallaties, elektrotechnisch
97	Terreininrichting standaard
98	Terreininrichting bijzonder
99	Terrein algemeen

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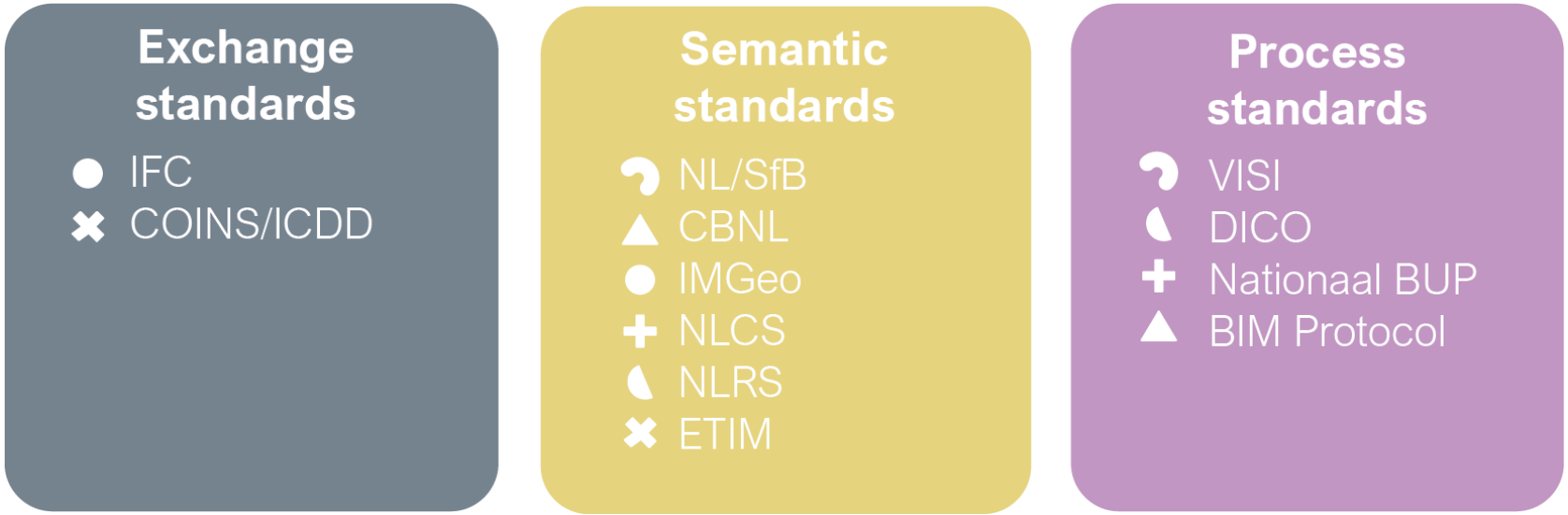
Open standards



BIM BASIS ILS

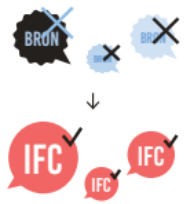
EENDUIDIG SAMENWERKEN

1. WAAROM WE INFORMATIE UITWISSELEN

Het doel van eenduidig uitwisselen is informatie over een bouwwerk efficiënt en effectief (her)gebruiken.

2. HOE WE INFORMATIE UITWISSELEN

Met behulp van de opendata-standaard IFC wisselen we informatie software-onafhankelijk uit, tijdens de hele levenscyclus van een bouwwerk.

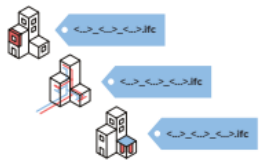


3. WAT WE AFSPREKEN OVER EENDUIDIG UITWISSELEN

We spreken in dit hoofdstuk af hoe de structuur van aspectmodellen wordt opgezet, zodat verschillende aspectmodellen uitwisselbaar en interpreteerbaar worden.

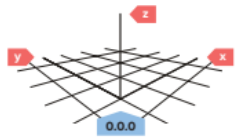
3.1 BESTANDSNAAM

- Zorg altijd voor een uniforme en consistente bestandsnaamgeving van de aspectmodellen binnen een project.



3.2 LOKALE POSITIE

- Coördineer onderling de lokale positie van het aspectmodel. Deze ligt vlakbij het nulpunt.



3.3 BOUWLAAGINDELING EN -NAAMGEVING

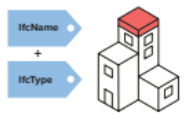
- Elk aspectmodel hanteert een consistente naamgeving.
- Ken alle objecten aan de juiste bouwlaag toe.
- Benoem alleen bouwlagen als IfcBuildingStorey.

3.4 CORRECT GEBRUIK ENTITEITEN

- Gebruik voor het object de meest geëigende Entity en vul waar mogelijk aan met een TypeEnumeration.

3.5 STRUCTUUR EN NAAMGEVING

- Voorzie objecten consistent van de eigenschappen Name en Type. Zo maakt de combinatie duidelijk wat het representeert.



3.6 CLASSIFICATIE SYSTEMATIEK

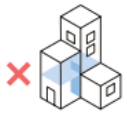
- Voorzie objecten altijd van een viercijferige NL-SfB code volgens de laatst gepubliceerde versie.

3.7 GEBRUIK PROPERTYSETS

- Gebruik voor het uitwisselen van eigenschappen wanneer mogelijk de PropertySets die buildingSMART voorschrijft in de internationale standaard.

3.8 DOUBLURES EN DOORSNIJDINGEN

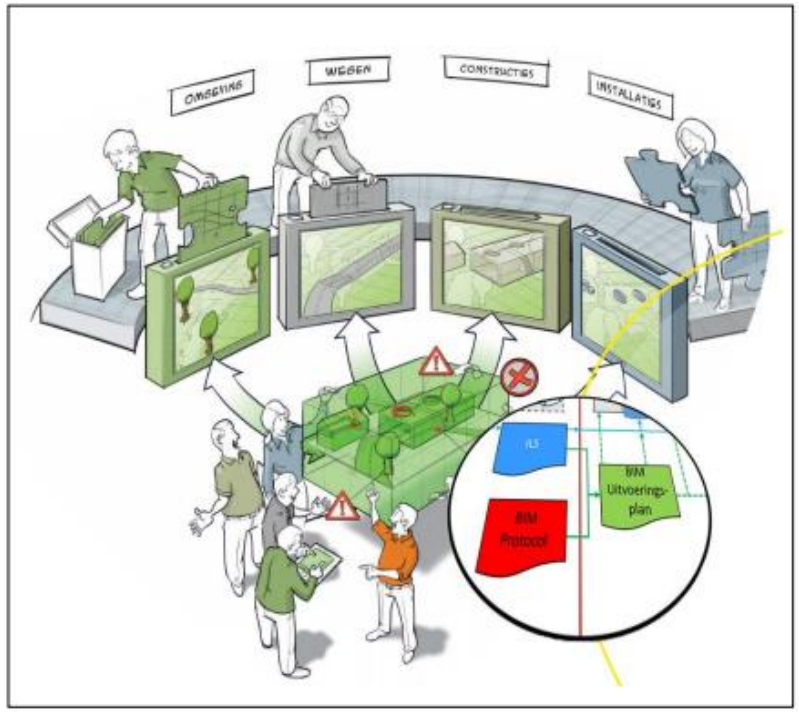
- Binnen één aspectmodel zijn doublures nooit toegestaan.
- In principe zijn doorsnijdingen van objecten binnen één aspectmodel niet toegestaan.



BOUW INFORMATIE RAAD

BIM Loket

Nationaal Model BIM Protocol



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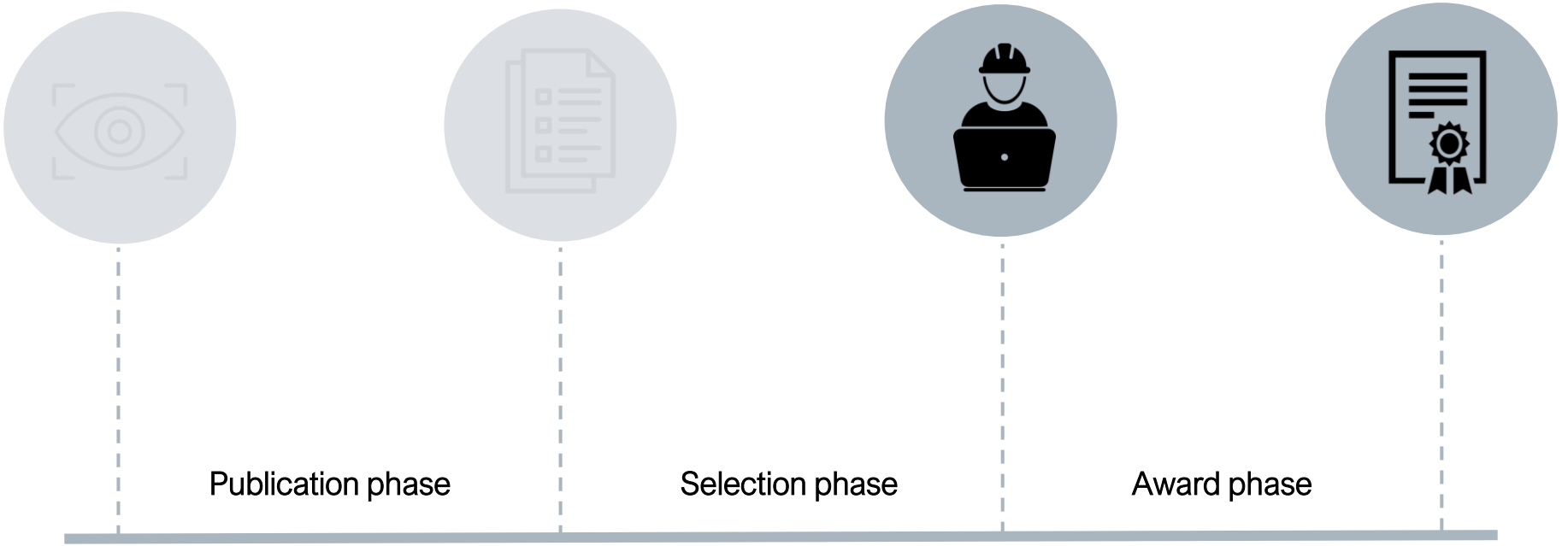
Public Procurement



Grounds for exclusion

Past performance

Suitability requirements

Level of technical competence

Reference works

Certification

AWARD PHASE

The tenderer can provide information on the quality of his work in the context of BIM by:

Execution Plan

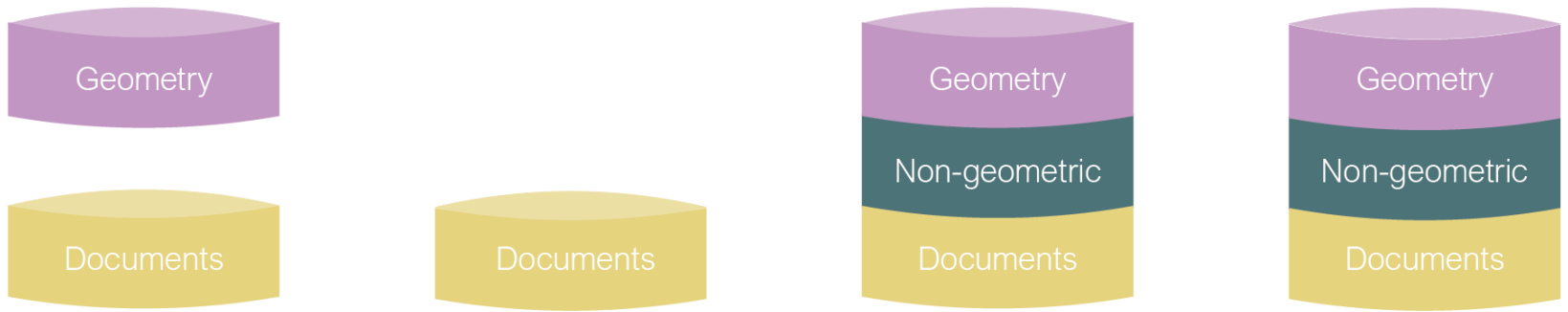
BIM Model

Practice

	A	B	C	D
Project information				
Structure of the project team				
BIM objectives for the project				
Acceptance criteria				
Information production methods and procedures				
Reference information and shared information sources				
Data exchange schedule				
The information standard				

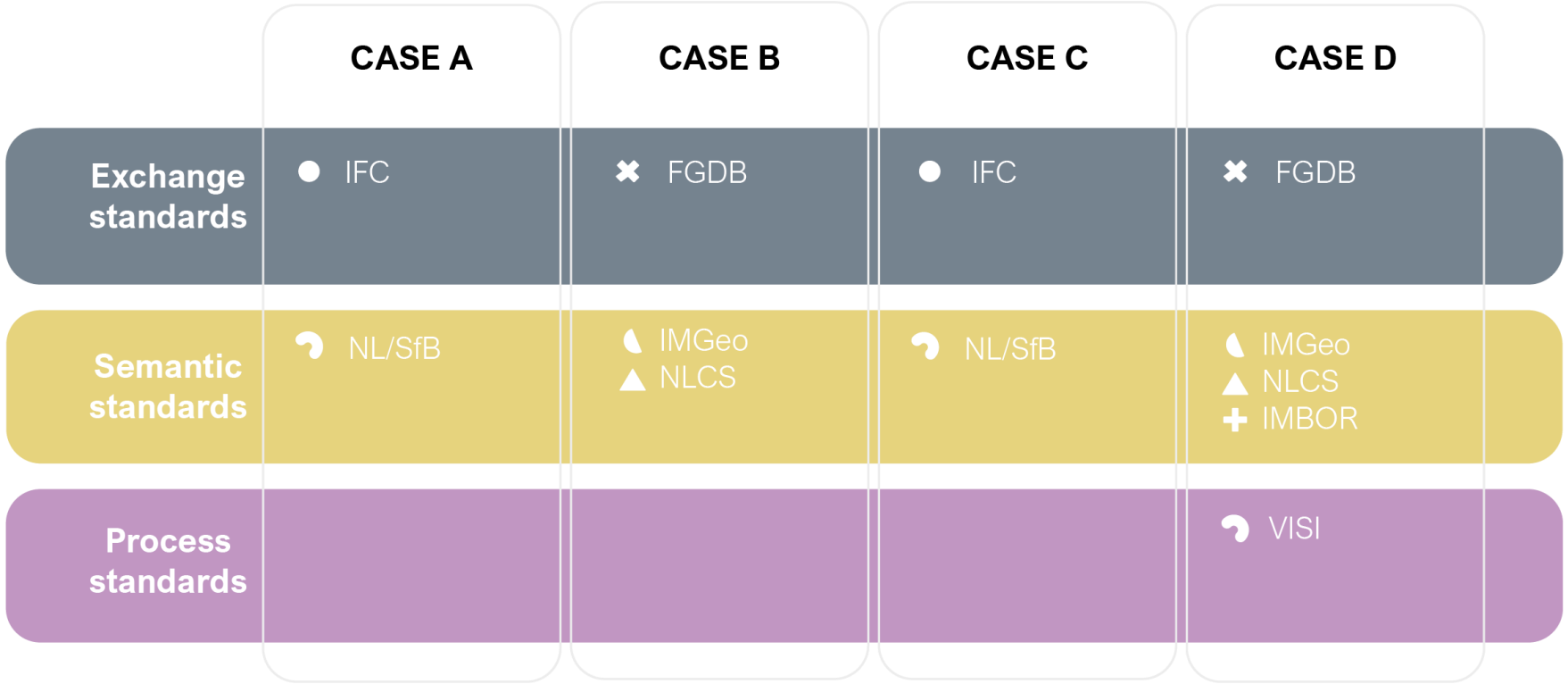
 Not included

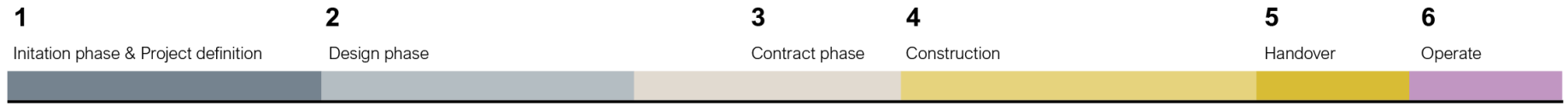
 Included



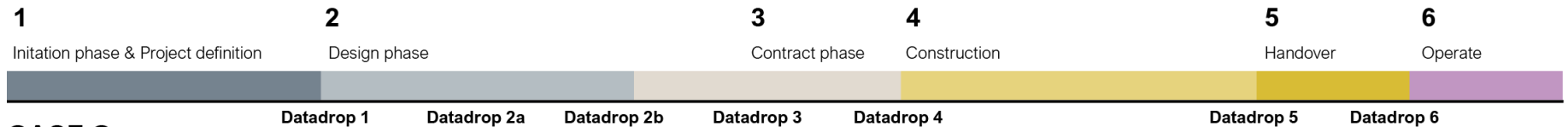
Case A **Case B** **Case C** **Case D**

Open standards

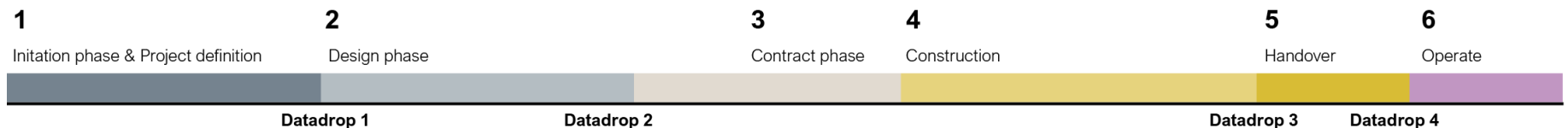




CASE A+B



CASE C



CASE D

Information Delivery Specification

- There is still **a lot of variety specifications** as each client tries to give it its twist and does not always describe it under the NEN-ISO 19650.
- Asset management is often traditional. **Information needs** of asset management **not yet identified**

"*You see that asset management is not yet able to cope with these data deliveries. They are still trying to figure out how to set up their systems, how to build them, and what information they need exactly*" (C1, 2022).

Project manager
Client

Selection and award

- Award and selection criteria related to data deliveries are not or hardly applied in the case studies
- One case made use of selection criteria related to BIM
- One case asked for an execution plan (not as award criterium)

Organizational conditions

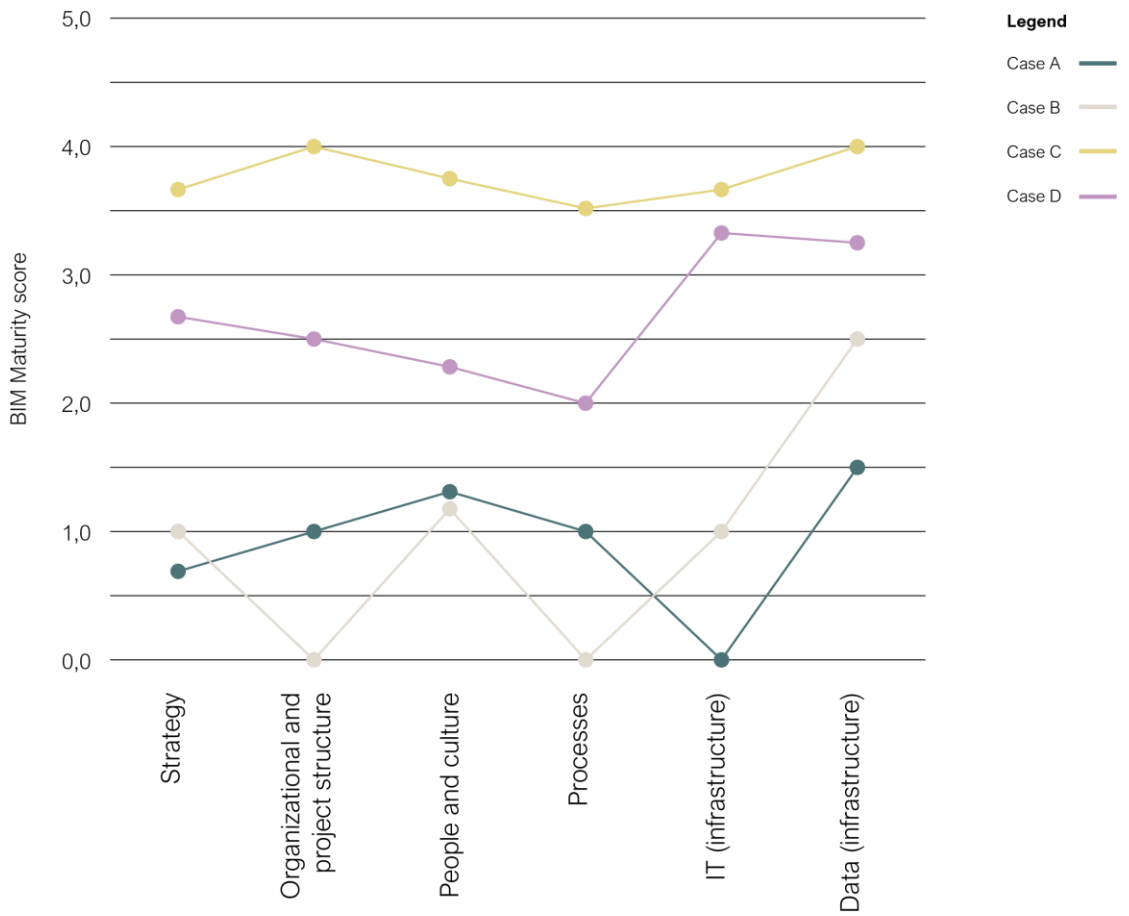
Project team

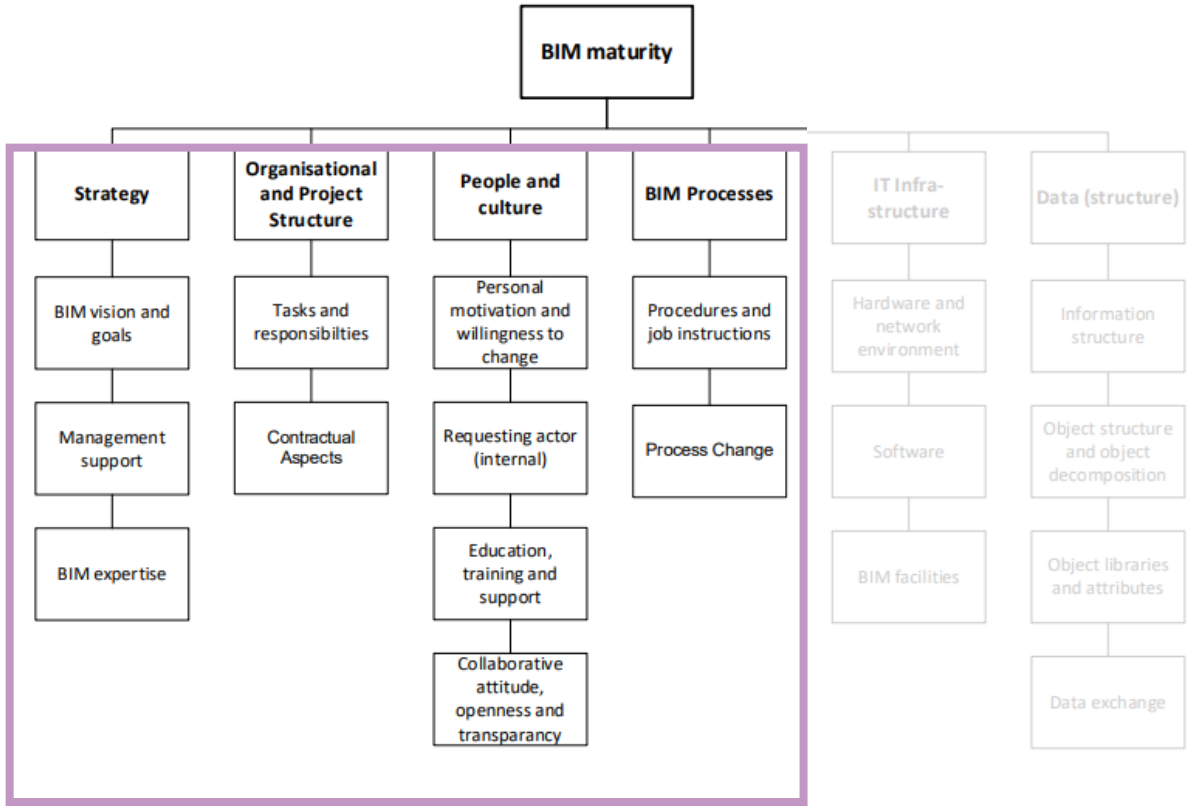
- In the project team of the client: vision, experience, knowledge and roles are often missing
- Project teams of (larger) contractors are already more geared up for digital information exchange

"*We contractors come up with the most wonderful things with 3D models, 4D, 5D connections, and integrations, all to promote and improve our work process. In the end, the client asks for a flattened digital drawing that you can't do anything with*". (D2, 2022)

BIM Coordinator
Contractor

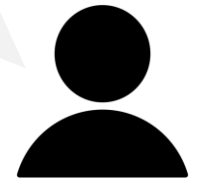
BIM maturity



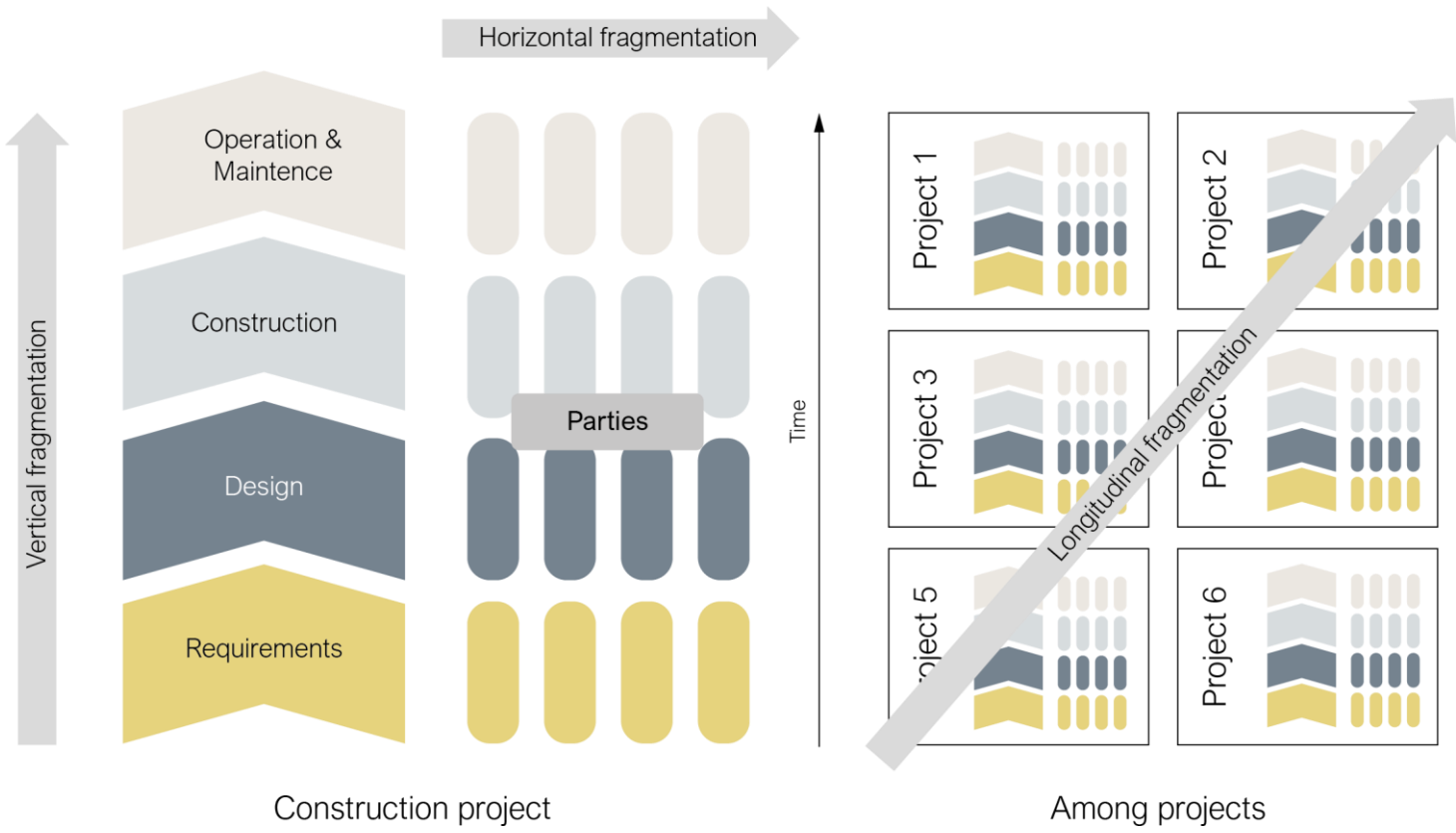


(Siebelink, 2018)

"It necessitates much more than a new system, a new contract, but also a new way of working among the employees" (B3, 2022)



BIM coordinator
Client



(Adriaanse, 2014)

Information loss

Collaborate

- Knowledge and data sharing
- Clients need to **collaborate more with each other** and **market parties** to achieve a uniform information delivery specification.

"*If you have one system for specifying the demand, the market is not constantly confronted with new demands and knows what to expect*" (Expert 1, 2022).

Expert 1


Introduction
Methodology
Findings
Conclusion
Recommendations

Public Procurement

- Contracting authorities have a **limited understanding of the information they need** to manage their assets efficiently.
- In the procurement process, accurate data exchange is not or hardly prioritized
- The **structure and terminology** used in the various delivery information specifications **vary greatly**
- **Award and selection criteria** concerning data and information management were **hardly used** in the case studies.

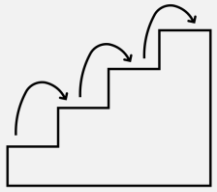
"How can **contracting authorities** (re)design the **procurement phases** to enhance **successful data exchange in construction projects**?"

Conditions

Building sector

Collaborate

Contracting authority



Maturity

Procurement

Uniform demand specification

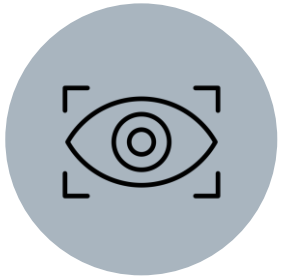
✚

Selection and Award criteria

Successful data exchange

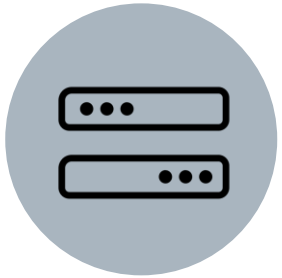

Introduction
Methodology
Findings
Conclusion
Recommendations

Recommendations for practice



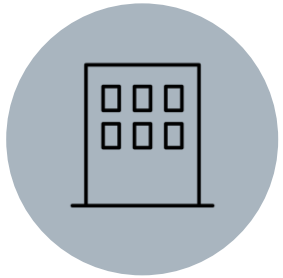
Formulate a vision

Softer aspects



Invest in systems

Create specifications

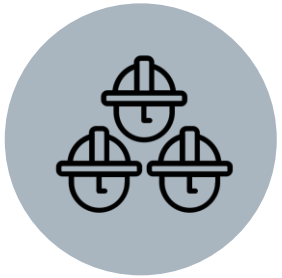


Selection criteria

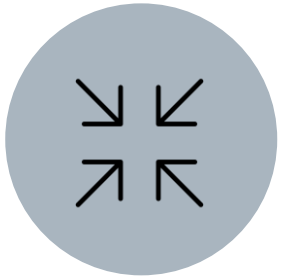
Award criteria

Recommendations future research

Selection and award criteria



Subcontractors and suppliers

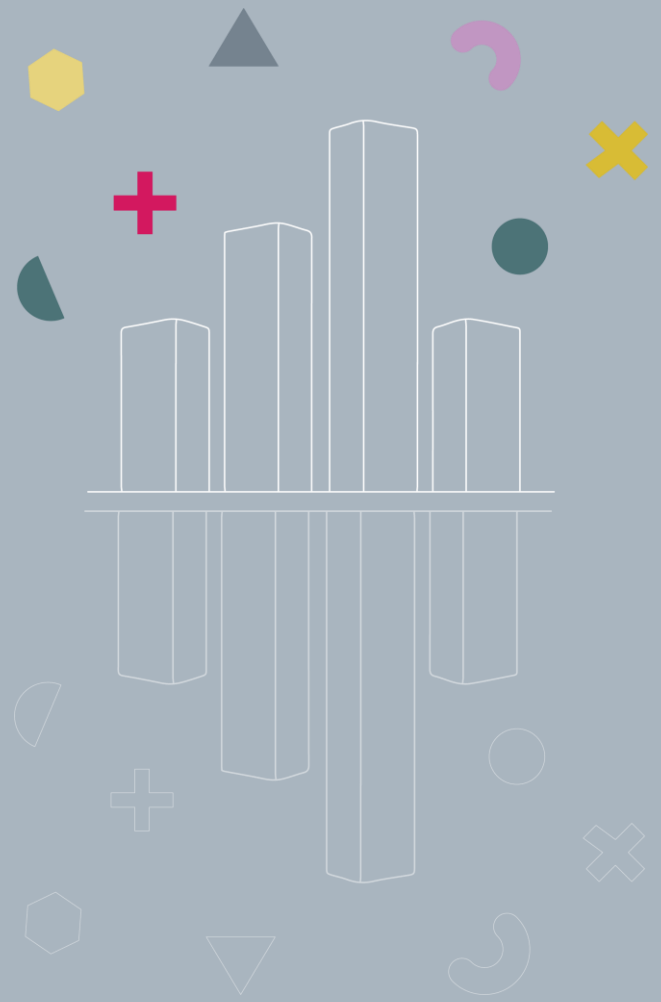


Smaller public clients

Organizational level

Outside the Dutch context

Other sectors



Questions?

Extra slides

Discussion

- The data exchange and the associated contractual agreements in projects received **limited attention** in the execution of the project
- Therefore, not and not all stakeholders had sufficient **knowledge** in this area.
- **Award and selection criteria** related to data deliveries are **not or hardly applied** in the case studies

Limitations

- Literature review was be **limited** to a few **databases**
- **Limited** number of **cases**
- **Demand characteristics** and **observer bias**
- **Limited interviews** to contracting authorities and contractor

Expert panel

- Statement I: Data is becoming increasingly important in the asset management of the public sector. Although there is a small group of frontrunners, the majority of contracting authorities are insufficiently mature in data and information management. They still do not know enough about what they want and can do with it.
- Statement II: Contracting authorities must formulate higher data and information product and process criteria following NEN-EN-ISO 19650.
- Statement III: Contracting authorities need to cooperate more to achieve a uniform information delivery specification.
- Statement IV: Many contractors can fulfill (higher) data-related product and process requirements, as well as criteria for selection and award.
- Statement V: The use of selection and award criteria will help to achieve better data deliveries and accelerate digitalization in the construction industry.