MAY 2025

Information Management in the Renovation and Restoration of Danmarks Nationalbank

MAY 2025

IKTECH

INFORMATIONS KOMMUNIKATIONS TECHNOLOGY

BIM ÍSLAND

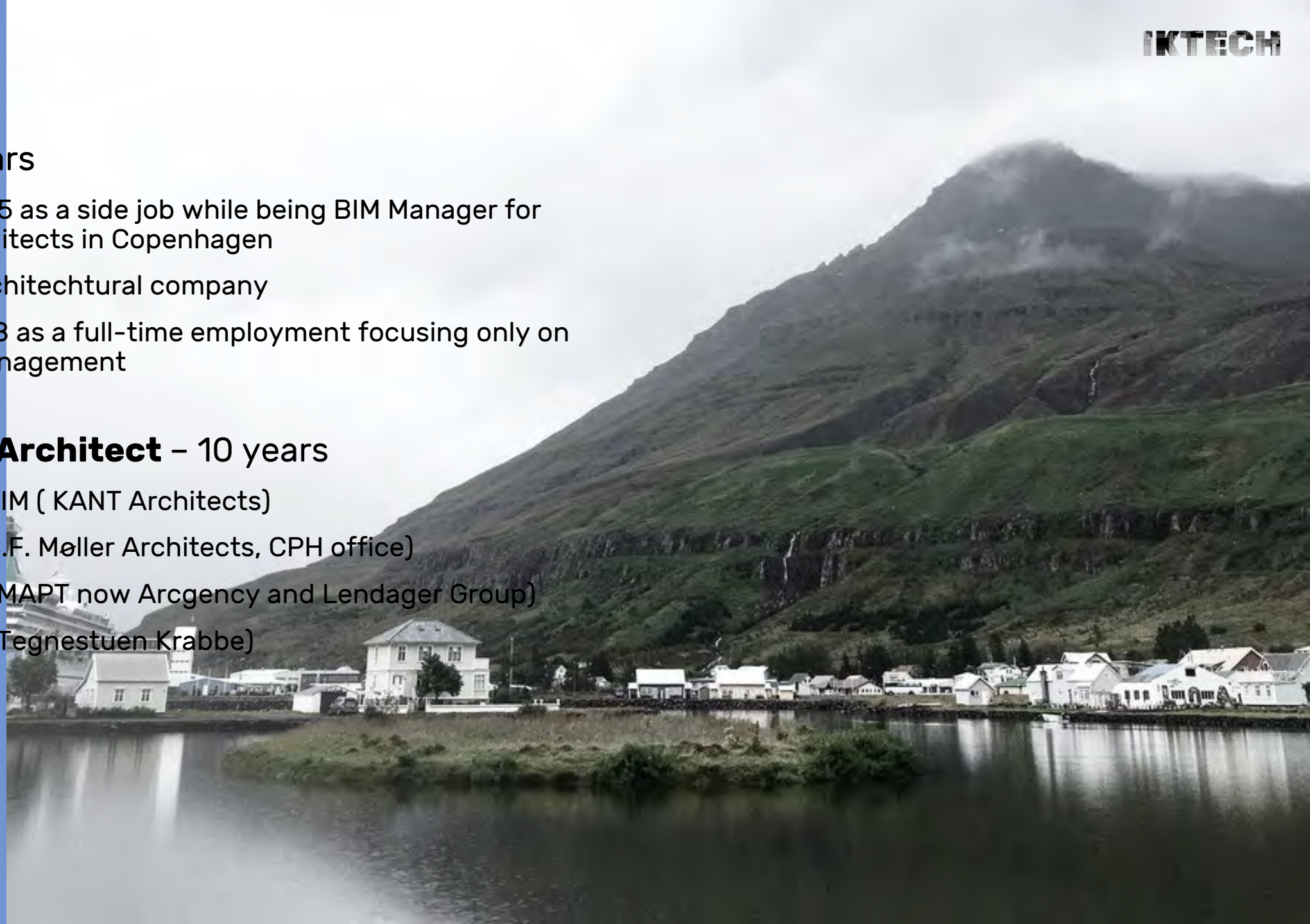
ABOUT

IKTECH – 9 years

- Founded in 2015 as a side job while being BIM Manager for C.F. Møller Architects in Copenhagen
- Started as a architechtural company
- From 2017/2018 as a full-time employment focusing only on ICT and BIM Management

Constructing Architect – 10 years

- Head of ICT & BIM (KANT Architects)
- BIM Manager (C.F. Møller Architects, CPH office)
- BIM Specialist (MAPT now Arcgency and Lendager Group)
- BIM Specialist (Tegnestuen Krabbe)



SERVICES

- We look together at your contractual-basis, resposibilities and processes for one or more projects.
- Identify in collaboration where and how it makes the most sense for you to invest in ICT and BIM
- Make a custom course of action on how to optimize ICT and BIM services in your projects

01
DIGITAL BUSINESS DEVELOPMENT

02
ICT-MANAGEMENT

03
CLASH DETECTION

04
BIM MANAGEMENT ON DEMAND

05
CUSTOM COURSES

06
QUANTITY TAKEOFF

07
REVIT SUPPORT / HOTLINE

08
AUTODESK LICENS SUPPORT

09
3D SCAN OG SUPPORT

CUSTOM COURSES & GUIDS

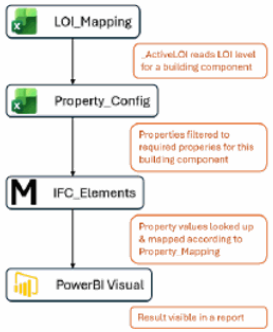
BIM PLAYBOOK

BIM PLAYBOOK

BIM PLAYBOOK

DAX MEASURES

A DAX measure is a formula that calculates a value dynamically at query time, meaning it recalculates every time a visual renders, based on whatever filters and selections are active in the report. Unlike a regular column which stores a fixed value per row, a measure has nor rows of its own, it produces a single result based on the current filter context.



In this dashboard the measures are the QA engine. They cross reference IFC_Element against the Property_Config and LOI_mapping to determine if elements/properties pass or fail.

DAX measures cannot dynamically reference a column by a string variable at runtime. This means that the SWITCH fan-out pattern hardcodes the mapping between Egenskabsnavn (property name) and IFC_Elements columns names.

Lets take a look at one DAX measure code to understand what is happening.

1. This is where the mapping key "Egenskabsnavn" is placed. It searches for the property name "Klassifikationskode" inside the Property_Config.

2. The look up value that contains the actual value inside the model. It needs to be identical to the column name in the M-Code.

This means that once a column name(property in a IFC file or a parameter in Revit) is updated in the source file, it needs to be updated in the M-code prune list, three DAX measures (Element_QA_Status, Manglende_Egenskaber and Egenskaber_Pass) and preferably the Property_Mapping sheet.

OUR CLIENTS

We help companies to help them selves

80% of all new startups do not focus on solving challenges that are not solved. They come up with a new solution or a new product for something that has already been solved by others.

Our primary focus is on solving our customers' challenges in one way or another.

As ICT Managers, we check whether the ICT requirements are met and that all parties in the projects do as agreed.

As BIM Managers, we help consultants develop a BIM policy, build standards and increase the skills of colleagues.

DANMARKS NATIONALBANK

- Constructed between 1965 and 1978
- Designed by the Danish architect Arne Jacobsen
- The project is regarded one of his most outstanding works.
- The building was heritage listed in 2009.
- The youngest listed building in Denmark.

THEN **& NOW**

In the 1950s – A home to brick buildings and warehouses near Holmens Kanal, close to the old Christiansborg Harbour.

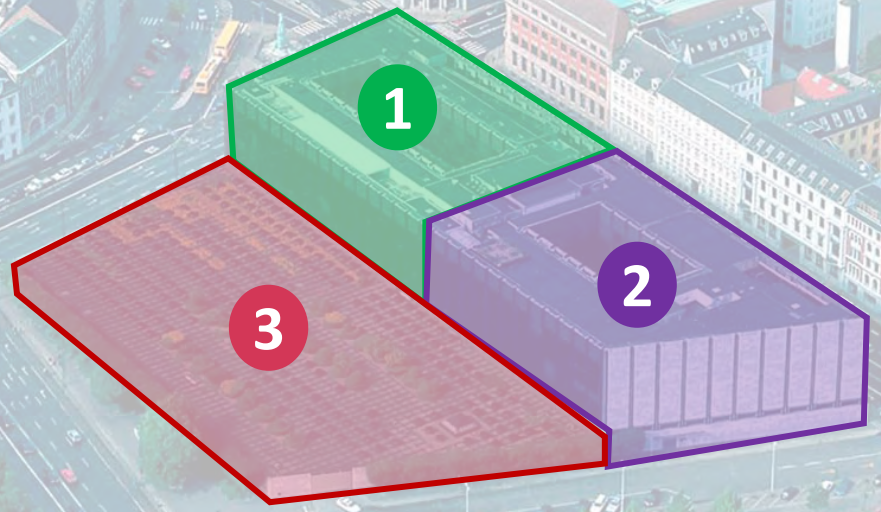
Today - A modernist masterpiece , designed by Danish Architect Arne Jacobsen and was built in phases between 1965 and 1978.

the BUILDING STAGES

First stage
1965-1971

Second stage
1972-1976

Third stage
1976-1978



the **FACADE**


Minimalistic double glass curtain walls
Norwegian Marble

the **FACADE**

The facade of the Nationalbank is clad in **Norwegian Porsgrunn marble** – a light gray natural stone that Arne Jacobsen liked to use.

Since 1965-1978, the slabs have been mounted with brackets that press the marble slabs against each other, which has led to them **bending and breaking**.

A total of **4,290** marble slabs need to be replaced.

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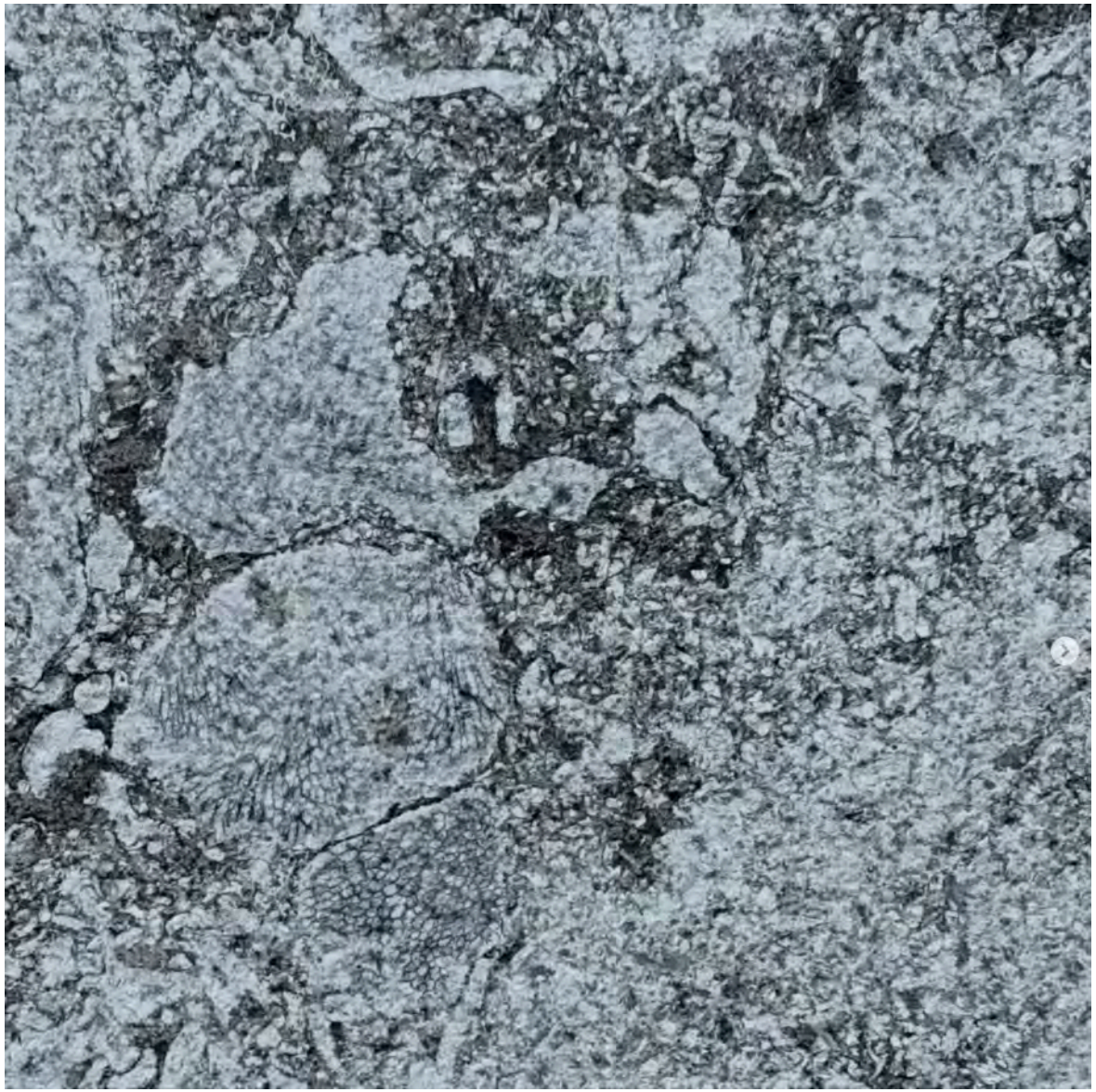
A pilot project and a long series of preliminary studies have led to the development of a **new method for mounting** the new marble slabs.

the **FACADE**

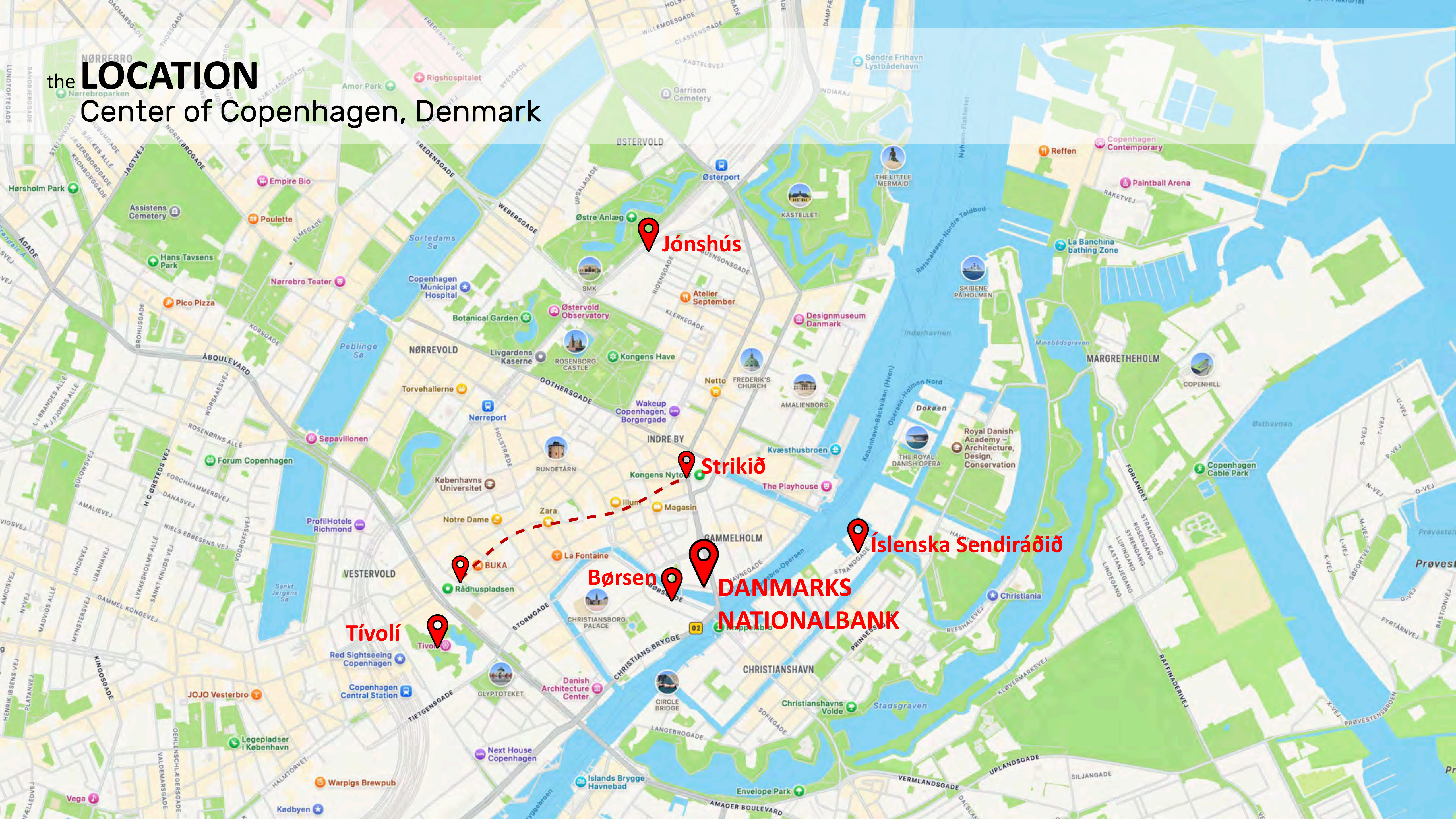
Small traces of life that lived **425 million years ago**, marine fossils.

In other words, remains of organisms that once lived in the sea. They date from a time when large parts of present-day Europe were under warm, shallow seas close to the Equator.

The fossils are mainly shells from mollusks, skeletal parts from small marine organisms, and prints and structures from organisms that have lived on or in the seabed.

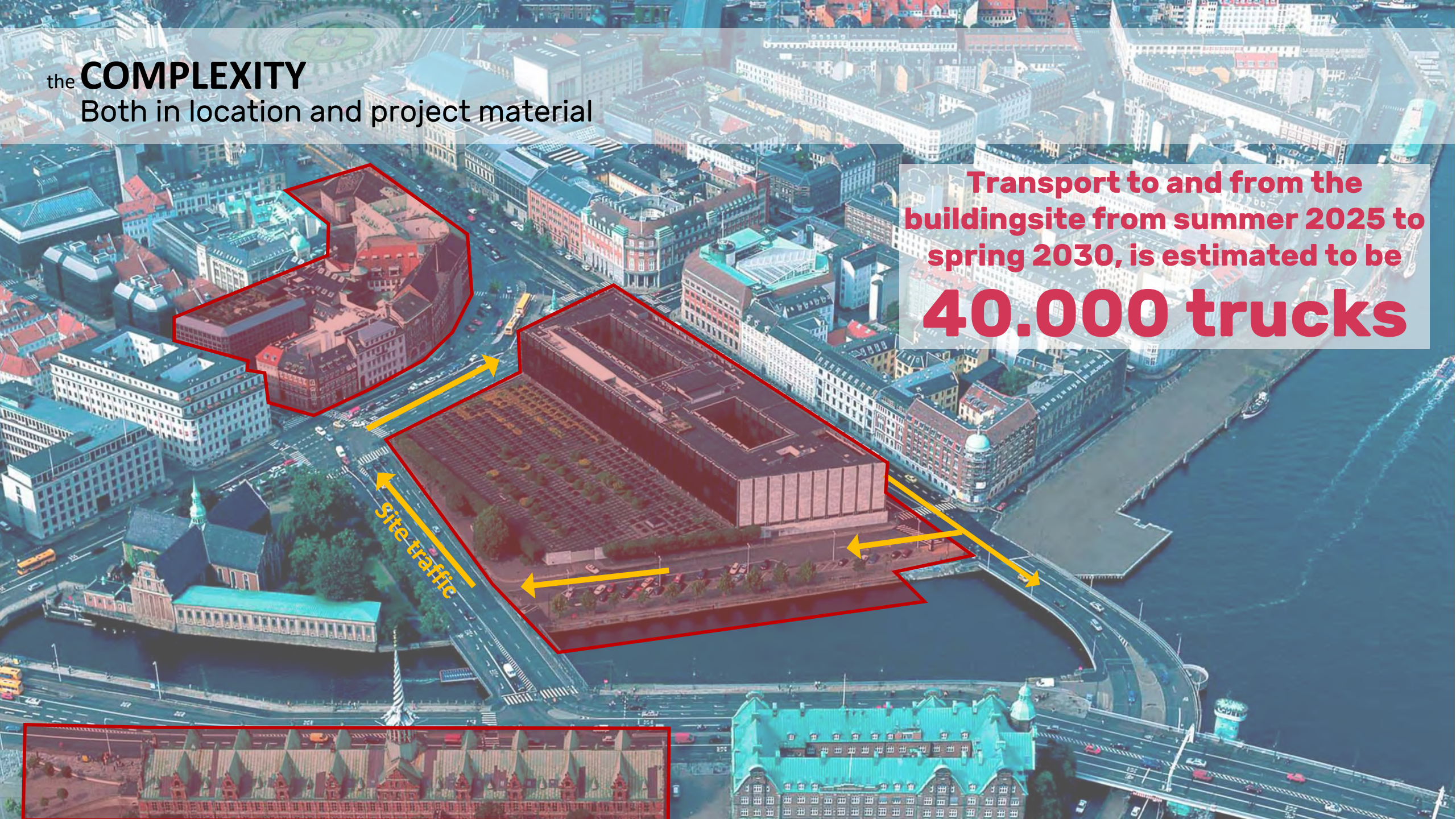


the LOCATION
Center of Copenhagen, Denmark



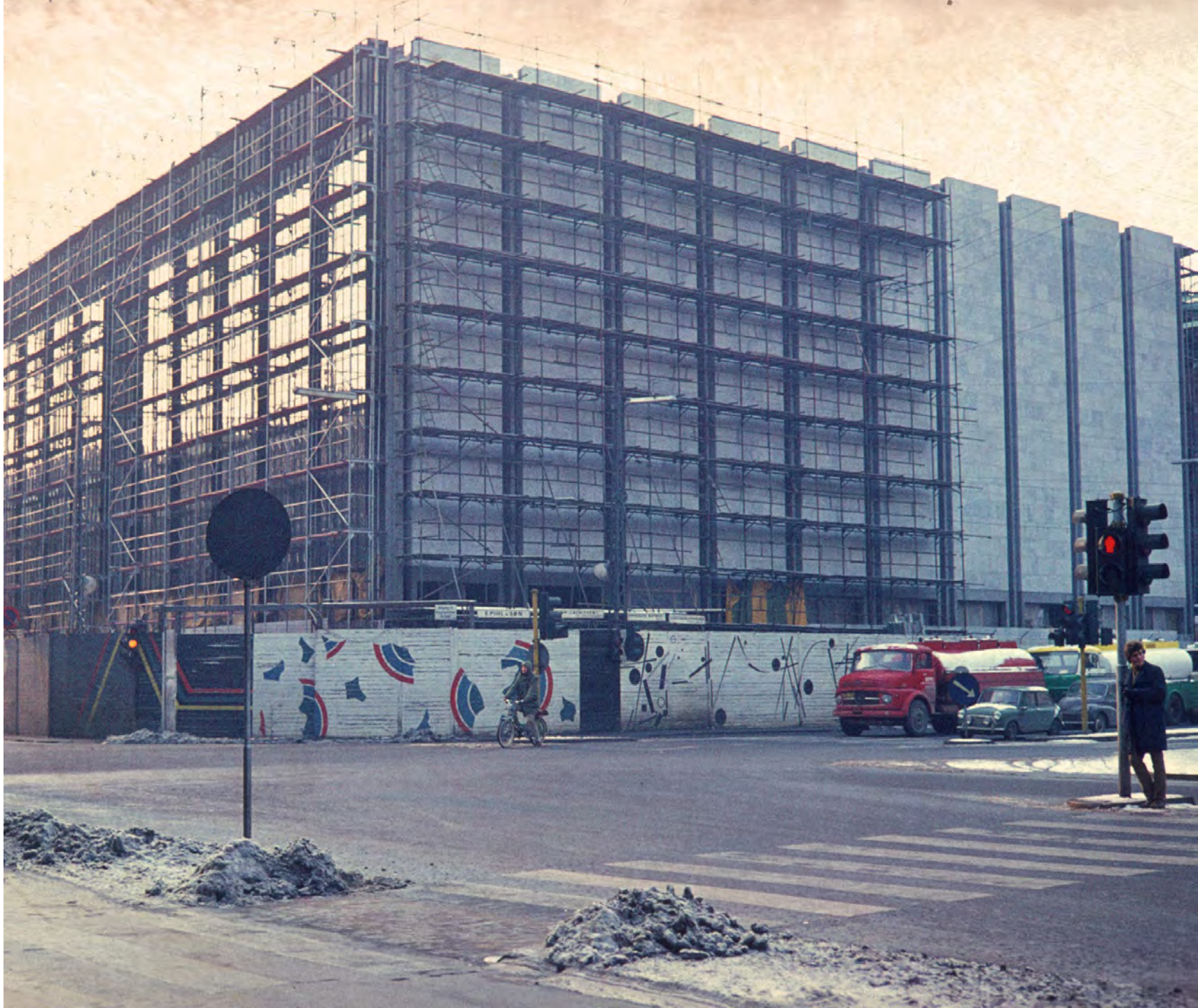
the **LOCATION**

Center of Copenhagen, Denmark


the COMPLEXITY
Both in location and project material
Transport to and from the buildingsite from summer 2025 to spring 2030, is estimated to be
40.000 trucks
site traffic

the **RENOVATION**

- Danmarks Nationalbank is facing the **largest renovation** project since the building's creation
- The renovation covers all 52,000 square meters of the building
- Total construction estimate of approx. **3 billion DKK** and is schedule to last until 2030
- The largest renovation **project in Danish history** and of a modernist architecture building



the RENOVATION
Why the intervention?

Hazardous Materials
PCB and asbestos contamination throughout the building require full removal and decontamination.

Climate Resilience
The building sits on reclaimed harbour land — 170 ground anchors now secure it against rising sea levels and cloudbursts.

Fire Safety
New emergency exits, sprinkler systems and smoke ventilation must be installed to meet modern standards.

Aging Infrastructure
Technical installations, marble facade panels, and internal fittings have exceeded their designed lifespan.

Heritage Compliance
All work is carried out in close dialogue with the Danish Agency for Culture and Palaces (Slots- og Kulturstyrelsen).

Modern Workplace
Energy efficiency, new IT networks and improved indoor climate must meet expectations Arne Jacobsen could not foresee in the 1960s.

the RENOVATION

Sub-projects and time estimation

DN300 Climate protection

- ❑ Climate protection of the building (sea level rise and cloudburst)
- ❑ 187 anchors and reinforcement of basement walls

Phase: Execution
Time estimat
Start April 2024
End November 2025

DN200 Outside workers

- ❑ Renovation of the facade - replacement of marble and windows
- ❑ Renovation of the roof deck on the low part of the building and the roof under the southern garden.
- ❑ Preservation of the gardens

Phase: Execution
Start May 2025
End November 2029

DN100 Inside workers

- ❑ Replacement of technical installations due to indoor climate and energy consumption
- ❑ Environmental remediation and fire safety
- ❑ Changed area

Time estimate Execution

Prepared works for DN100:
Phase: Execution
Start September 2025
End September 2026

DN100 Reconstruction:
Start 2026
End 2030

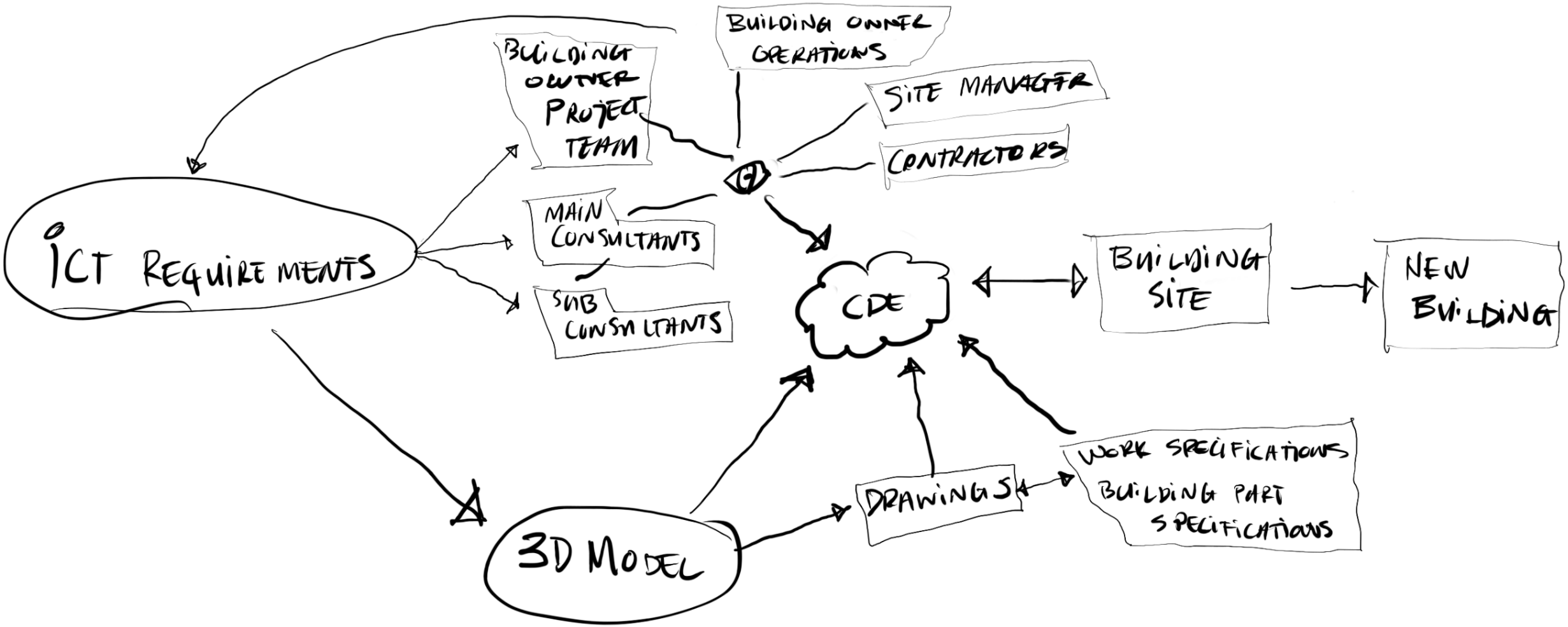
Move in date: November 2030

why **ICT?**

By setting the **right requirements for digital deliveries**, we can ensure data that can be used throughout the **entire life cycle of a facility or building** – from the first sketch, until the facility/building is put into operation, and until it is to be dismantled and recycled many years later.

Overall, **well-defined** processes and requirements save both time and resources, while **providing higher quality** and much more transparent and open communication.

why **ICT?**


BUILDING OWNER OPERATIONS
BUILDING OWNER PROJECT TEAM
SITE MANAGER
CONTRACTORS
MAIN CONSULTANTS
SUB CONSULTANTS
ICT REQUIREMENTS
CDE
BUILDING SITE
NEW BUILDING
3D MODEL
DRAWINGS
WORK SPECIFICATIONS
BUILDING PART SPECIFICATIONS

the ICT-SPECIFICATIONS
Reflections from the client

Incorporation of all parties in the ICT specification from the start.

When tendering the project out for a Main Consultant, the only requirements that were included were for the Main Consultanty **and not for the contractors.** This was because the tendering form had not been determined for the contractors.

In hindsight, it is typical that there are **co-designing contractors**, especially for the technical part, which could have easily been incorporated from the start - but this was done too late and after tendering for these. Changes to requirements must therefore go through several parties for acceptance, even if they are requirements set directly by the client.

Louise E. Hansen, ICT Project Manager at Danmarks Nationalbank

the ICT & BIM ORGANISATION

Danmarks Nationalbank ICT & BIM organisations

Bygherre

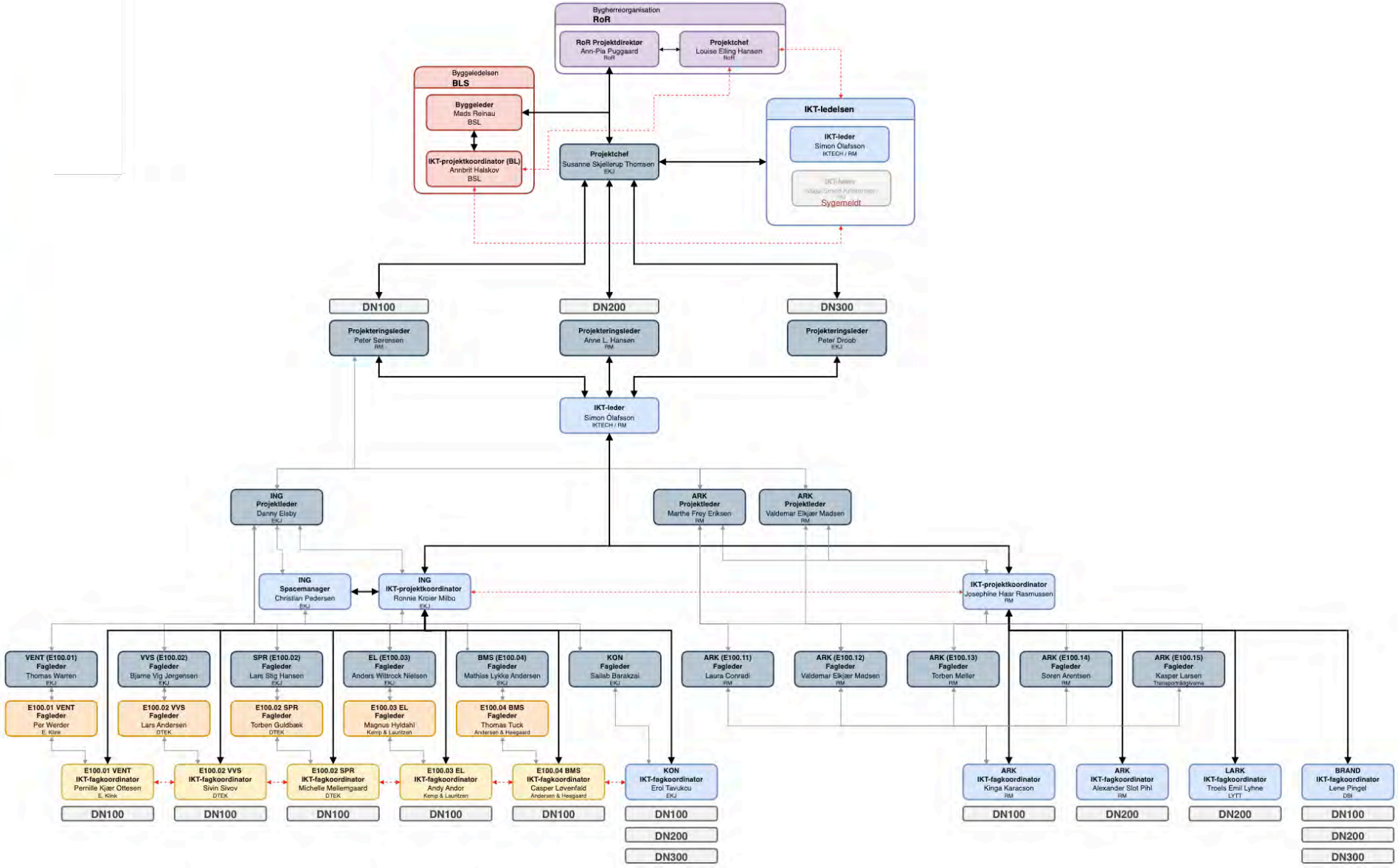
Totalrådgiver
PLR/PL/Fag-leder

Totalrådgiver
IKT-roller

Byggeleder

Entreprenør
Fagleder

Entreprenør
IKT-fagkoordinatorer



the ICT & BIM ORGANISATION

Simplified ICT organisation diagram

DANMARKS NATIONALBANK

Client / Building Owner
PROJECT LEADER

ICT PROJECT MANAGER

ICT PROJECT COORDINATOR

CLIENT CONSULTANT
SITE MANAGER

MAIN CONSULTANT
PROJECT MANAGER

RØRBÆK OG MØLLER ARKITEKTER A/S

ICT-MANAGER

ARCHITECTURE
PROJECT LEADER

ENGINEER
PROJECT LEADER

ICT PROJECT COORDINATOR

ICT PROJECT COORDINATOR

ARCHITECTURE	LANDSCAPE	MEP	PLUMBING	ELECTRICITY	BMS	STRUCTURAL
ICT COORDINATOR	**ICT COORDINATOR**	**ICT COORDINATOR**	**ICT COORDINATOR**	**ICT COORDINATOR**	**ICT COORDINATOR**	**ICT COORDINATOR**
RØRBÆK OG MØLLER ARKITEKTER A/S	LYTT	E. KLINK	DTEK	Kemp Lauritzen	ANDERSEN & HEEGAARD	
Varmings Tegnestue						

ICT & BIM ORGANISATION
Reflections from the client

The **ICT Manager's** position in the organization.

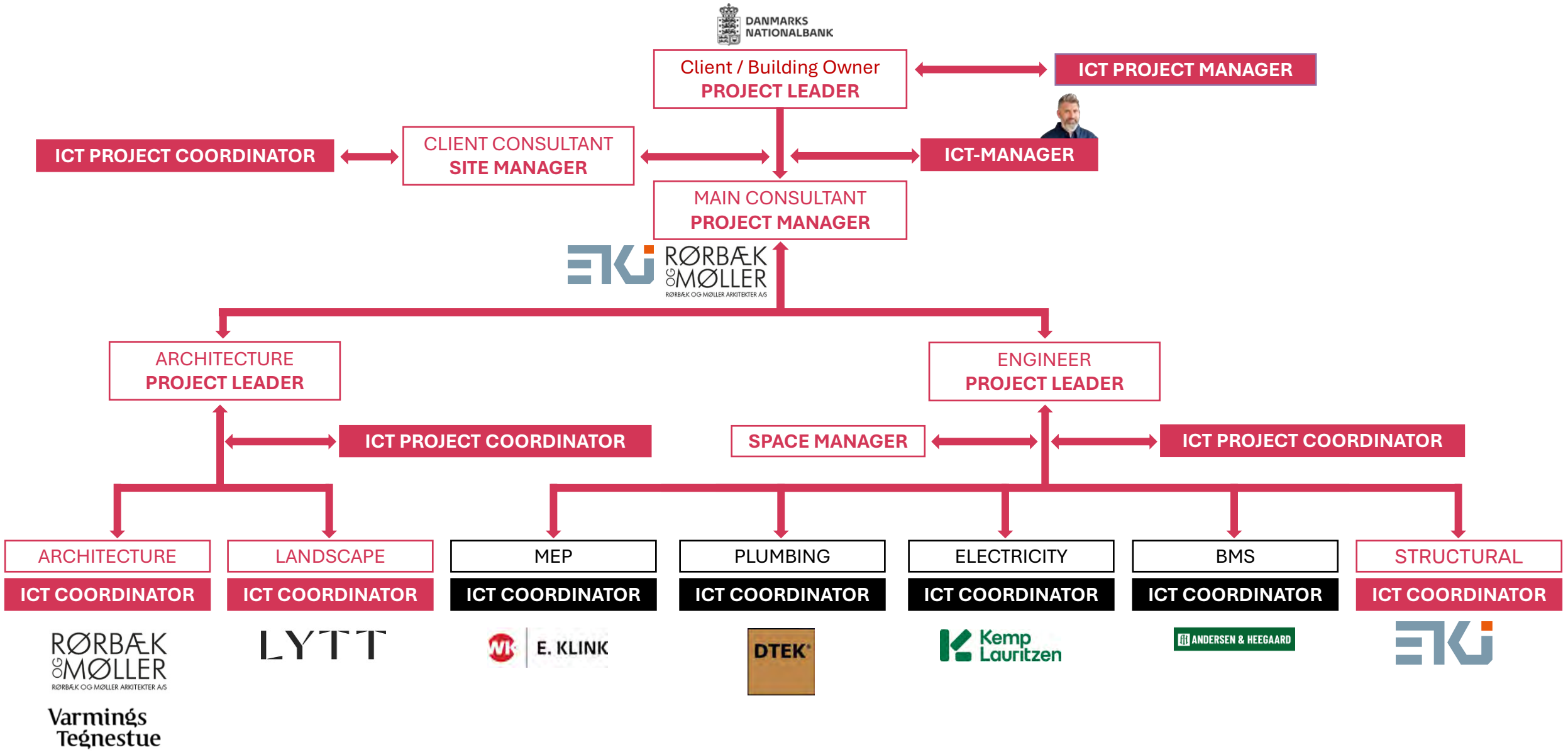
The positions as placed is traditionally placed with the Main Consultant as it is in our project. This can pose some challenges, to both the Client and the Consultants.

The challenges are that the ICT Manager is **the client's person** on the project, **who must look after the client's interests**.
This can be a challenge when the ICT Manager is together with the Project Management and on our case the Main Consultant.

Louise E. Hansen, ICT Project Manager at Danmarks Nationalbank

the ICT & BIM ORGANISATION

Simplified ICT organisation diagram



ICT & BIM ORGANISATION

Reflections from the client

The **Space Manager** position in the organization.

The role of a Space Manager should be more involved that it is, the Space Manager should be combined with the ICT Project Coordinator for the Engineering / Installations of the project.

Andy Andor, ICT Manager at Kemp & Lauritzen

the ICT REGULATION

Digital construction in Denmark

2013

No. 118 of 06-02-2013

Regulation on use of information and communication technology (ICT in public construction

No. 119 of 07-02-2013

Regulation on use of information and communication technology (ICT in social housing

the ICT REGULATION

Description of YBL 18 - 9. Other Services

9.0	**ICT Management**
9.1	Classification
9.2	Digital communication
9.3	Establishment of communication platform
9.4	Digital design
9.5	Digital tendering
9.6	Bill of quantities
9.7	Digital delivery
9.8	Digitalisation of existing conditions
9.9	Special visualisation
9.10	Other digital services

the ICT REGULATION

Description of YBL 18 - 9. Other Services

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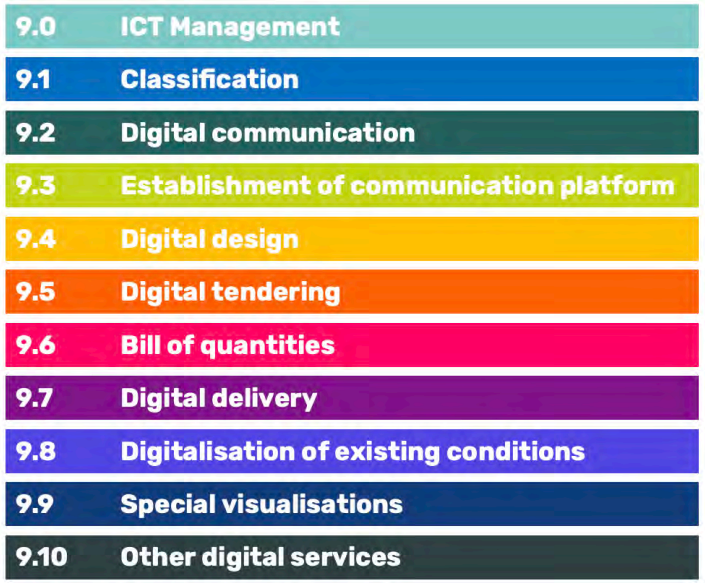
the ICT REGULATION

Specified in the project ICT-specifications

ICT-SPECIFICATIONS

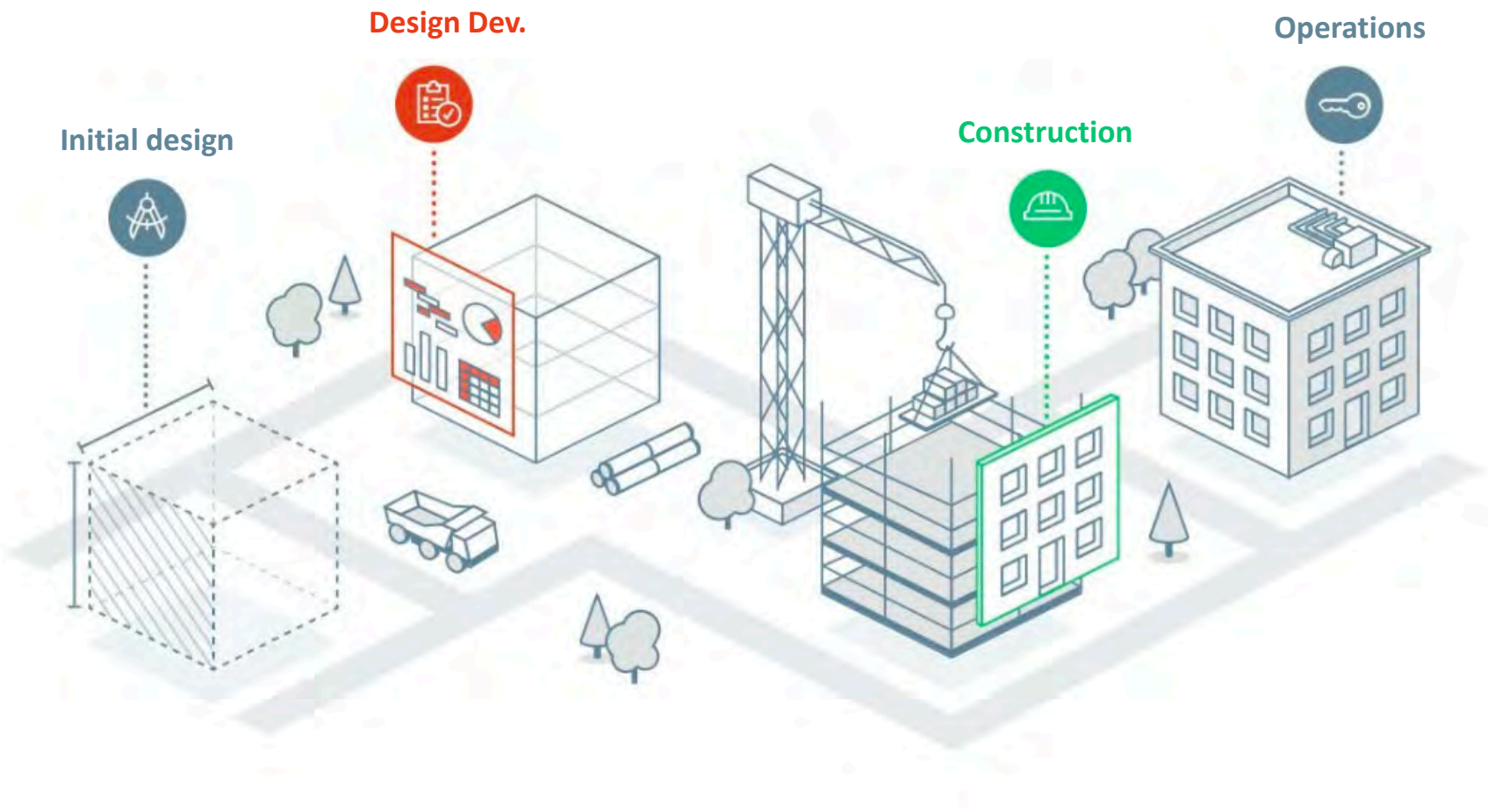


ICT-PROCESMANUAL

the ICT-SPECIFICATIONS

Traditional building owners process for implementing ICT-deliverables

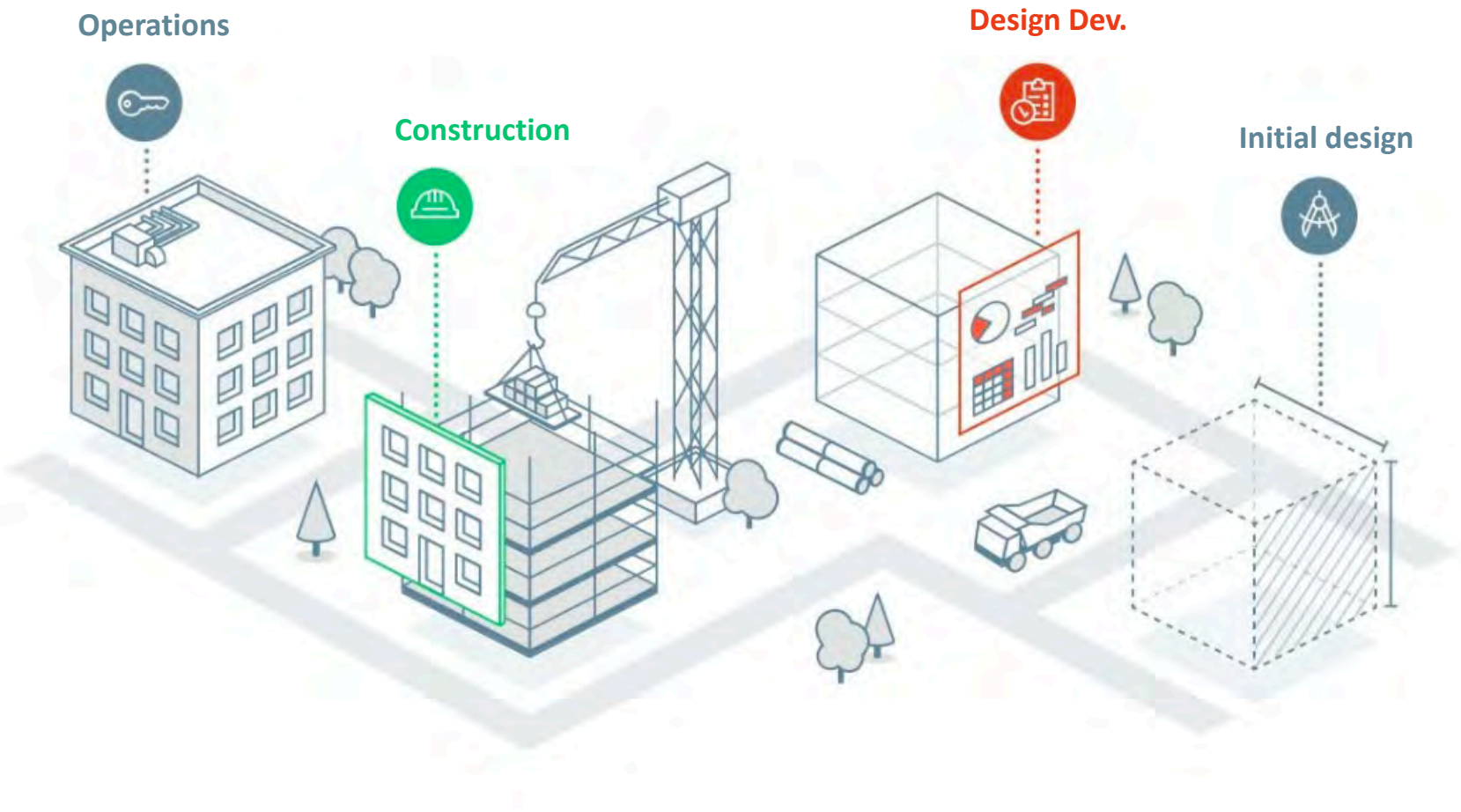
Initial design | **Design Development** | **Construction** | **Operations**



the ICT-SPECIFICATIONS

Danmarks Nationalbank approach > A reversed the process!

Operations | **Construction** | **Design Development** | **Initial design**



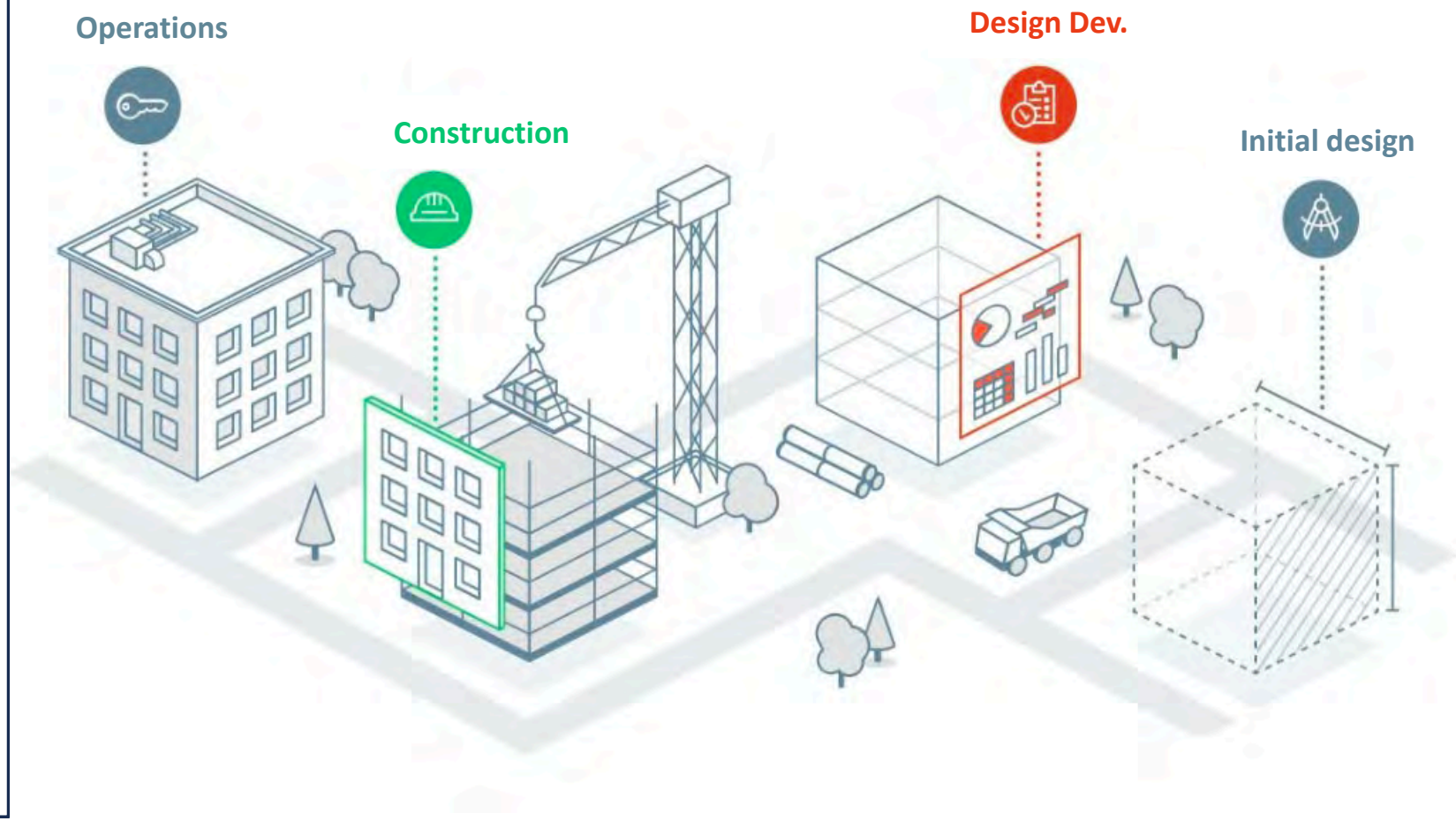
Danmark Nationalbank (DN) started by clarifying operational needs before reviewing the design requirements.

We build for operations

- ❑ What requirements does the operations have for the handover.
- ❑ Existing or new operating system and requirements
- ❑ How will future operations be carried out and what materials should be available for operations

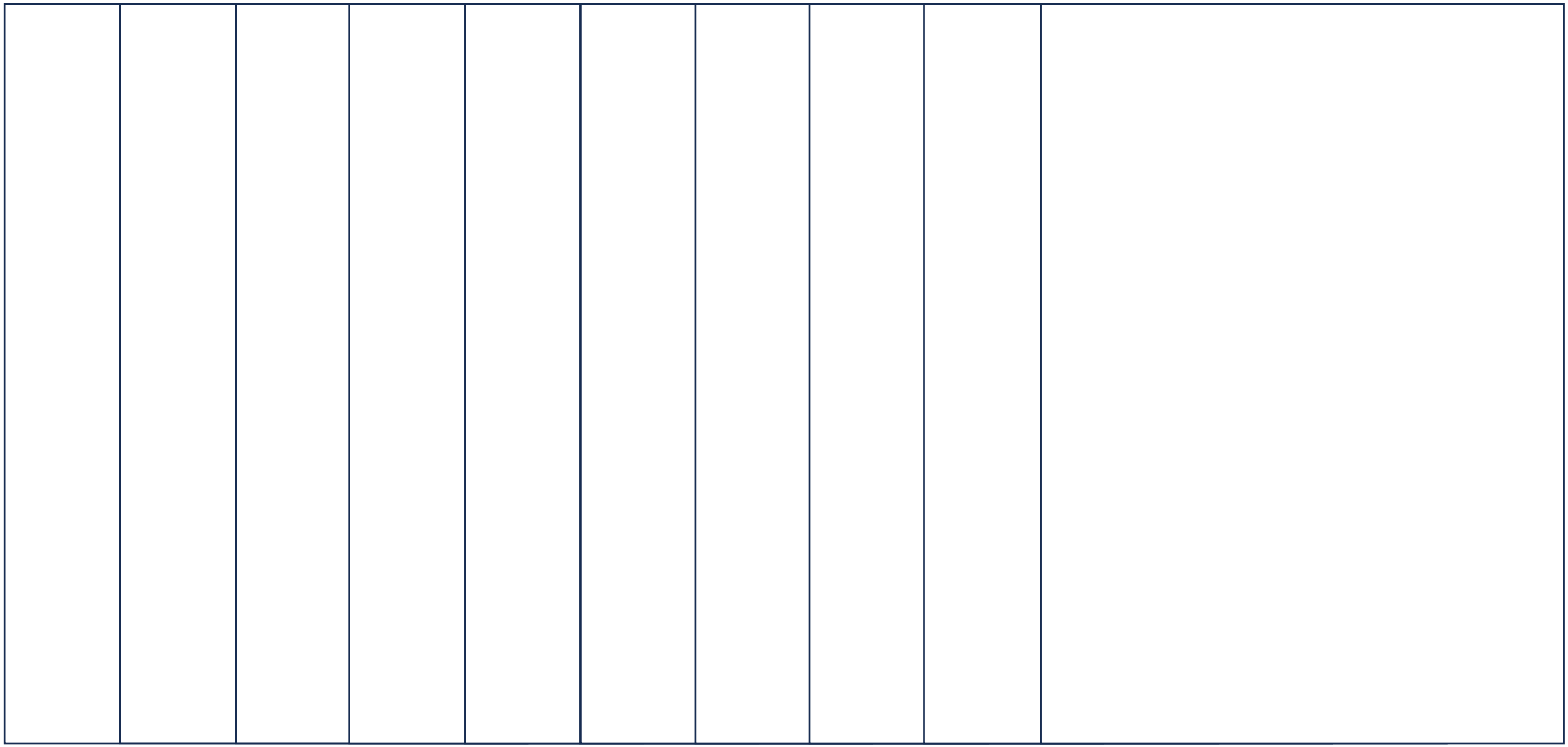
the ICT-SPECIFICATIONS

Project specific aimed to make best grounds for Operations and Maintenance



the **ICT-SPECIFICATIONS**

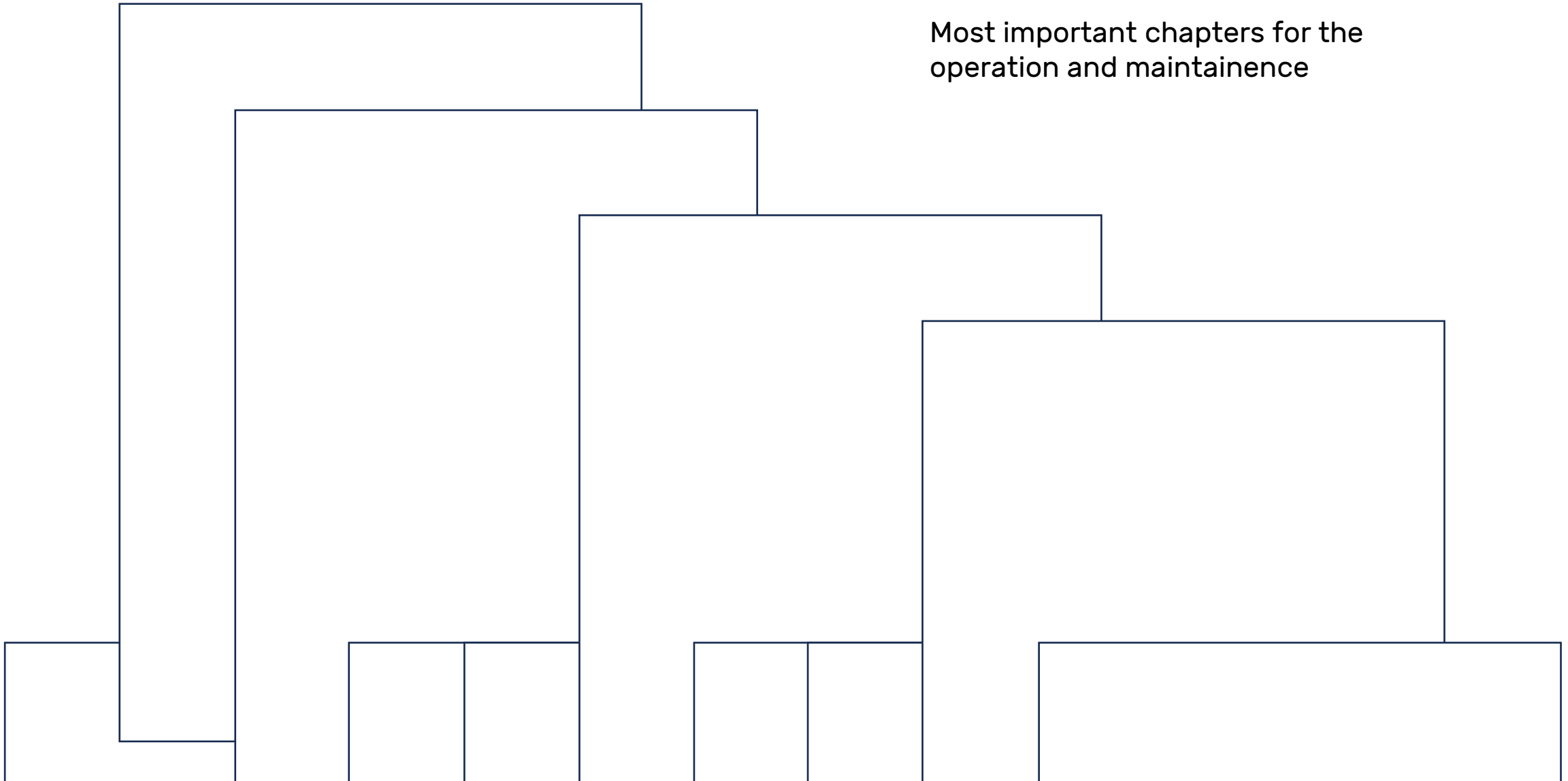
Project specific aimed to make best grounds for Operations and Maintenance



the **ICT-SPECIFICATIONS**

Project specific aimed to make best grounds for Operations and Maintenance

Most important chapters for the operation and maintainence



the **ICT-SPECIFICATIONS**

Project specific aimed to make best grounds for Operations and Maintenance

…together with the Delivery Specification and Building Part Specification

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Project specific aimed to make best grounds for Operations and Maintenance

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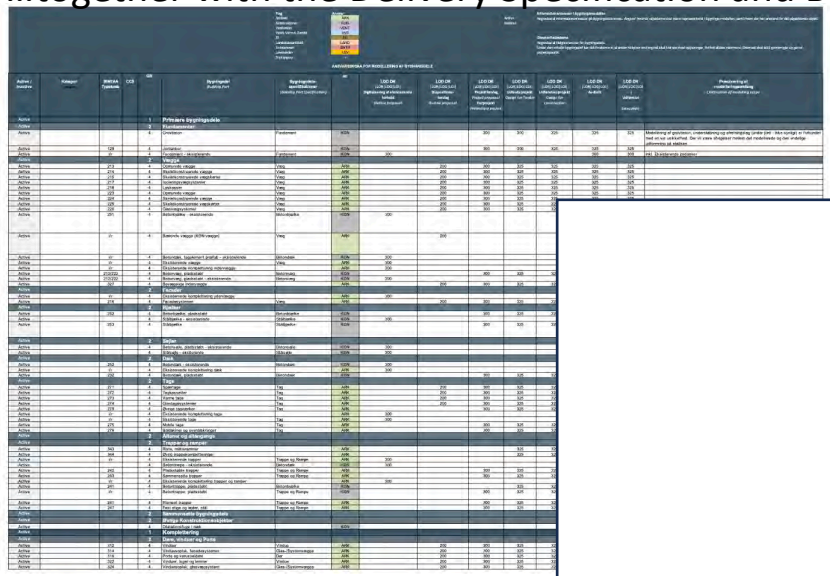


the SOFTWARE DIAGRAM

...and the work process to solve the data deliveries on the project

Dalux

The projects Common Data Environment platform, provided by the client.
ISO 19650 compliance

- ❑ Upload according to milestones
- ❑ Upload with Revit plug-in

EG MainManager

The building owners Facility Management platform, provided by the client.

- ❑ All documentation for As Built
- ❑ All Data for Operations and Maintainance

Autodesk Construction Cloud

Main Consultants Collaboration platform, for Revit model coordination.
ISO 19650 compliance

- ❑ Live link between disciplines
- ❑ No uploads. No packages. Just live link!

Autodesk Revit

The projects main authoring tool, chosen by the Main Consultant.

Microsoft SharePoint

Main Consultants Collaboration platform, for documents and office files.
A digital server.

NBS Nordic

Specification software with a Revit plugin.
Export of Work Specifications / BuildingPart Specification.

EG AjourCollab

Data management platform with a Revit plugin connection. Export of Tenderlist / Bidlists.

Autodesk Navisworks

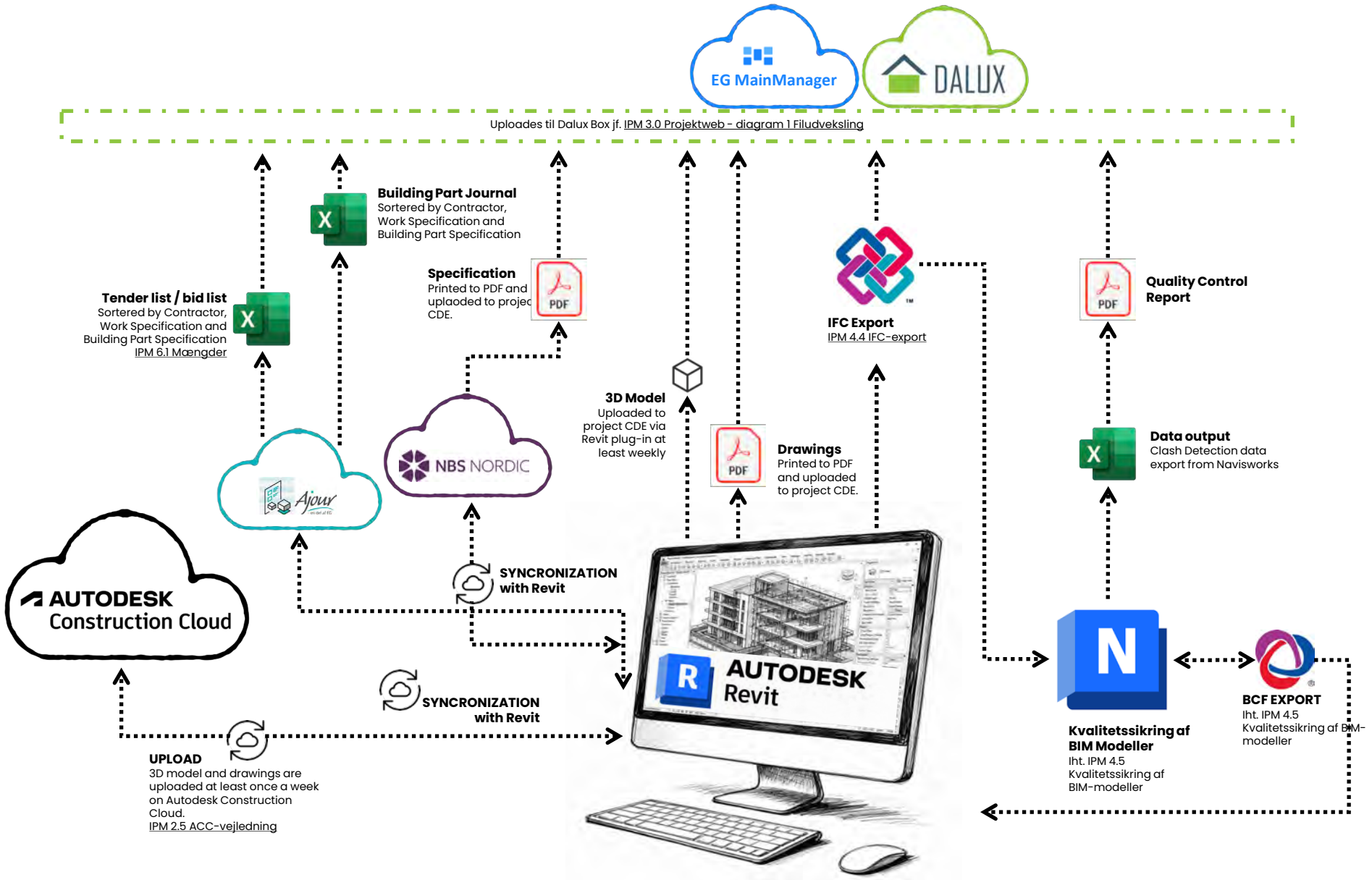
Former Clash Control tool, used by the Main Consultant

Solibri

Current Clash Control tool, chosen by the Main Consultant and by the Electric Contractor connected by BCF Live Connector into Dalux.

the SOFTWARE DIAGRAM

...and the work process to solve the data deliveries on the project



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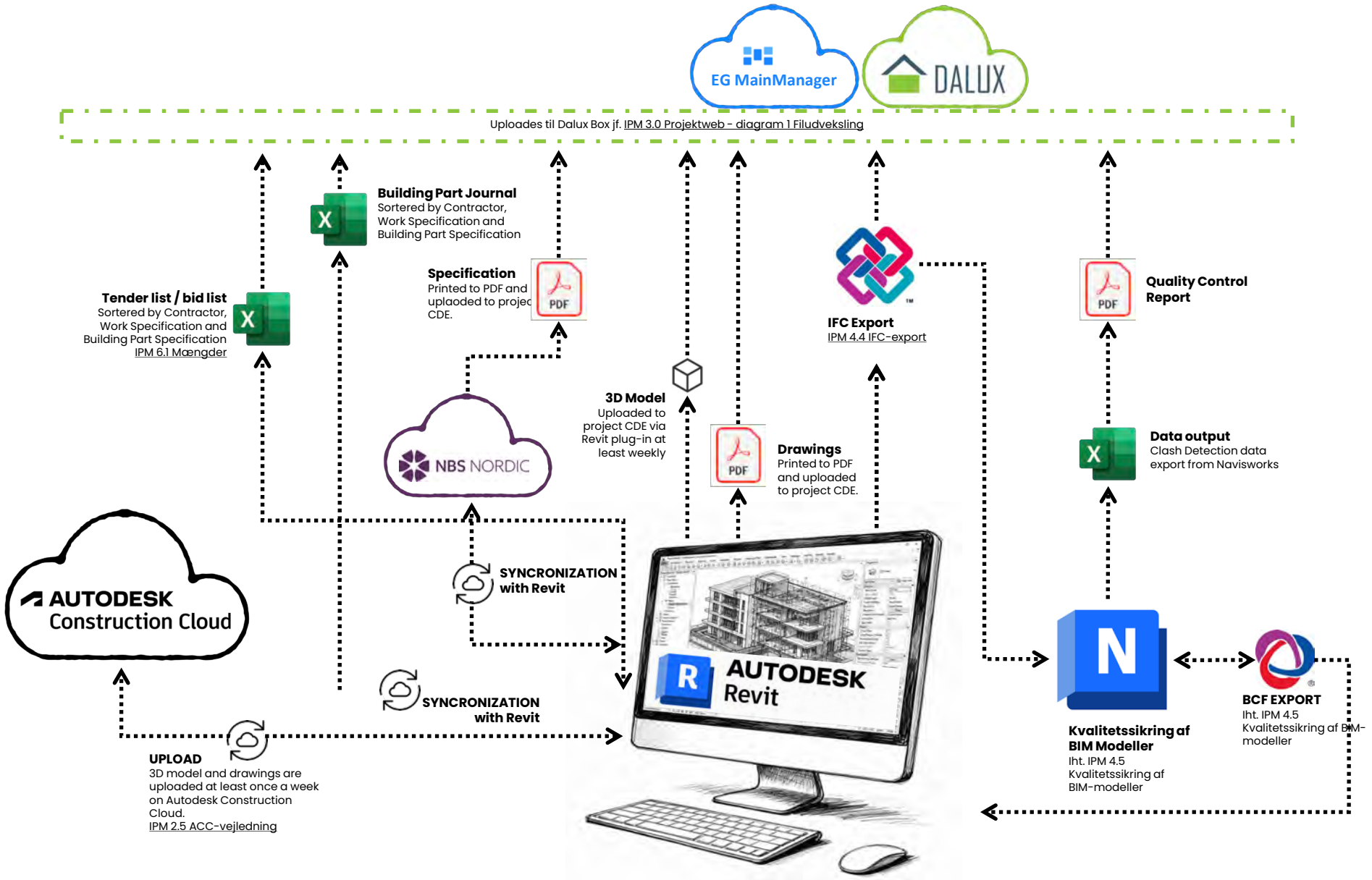

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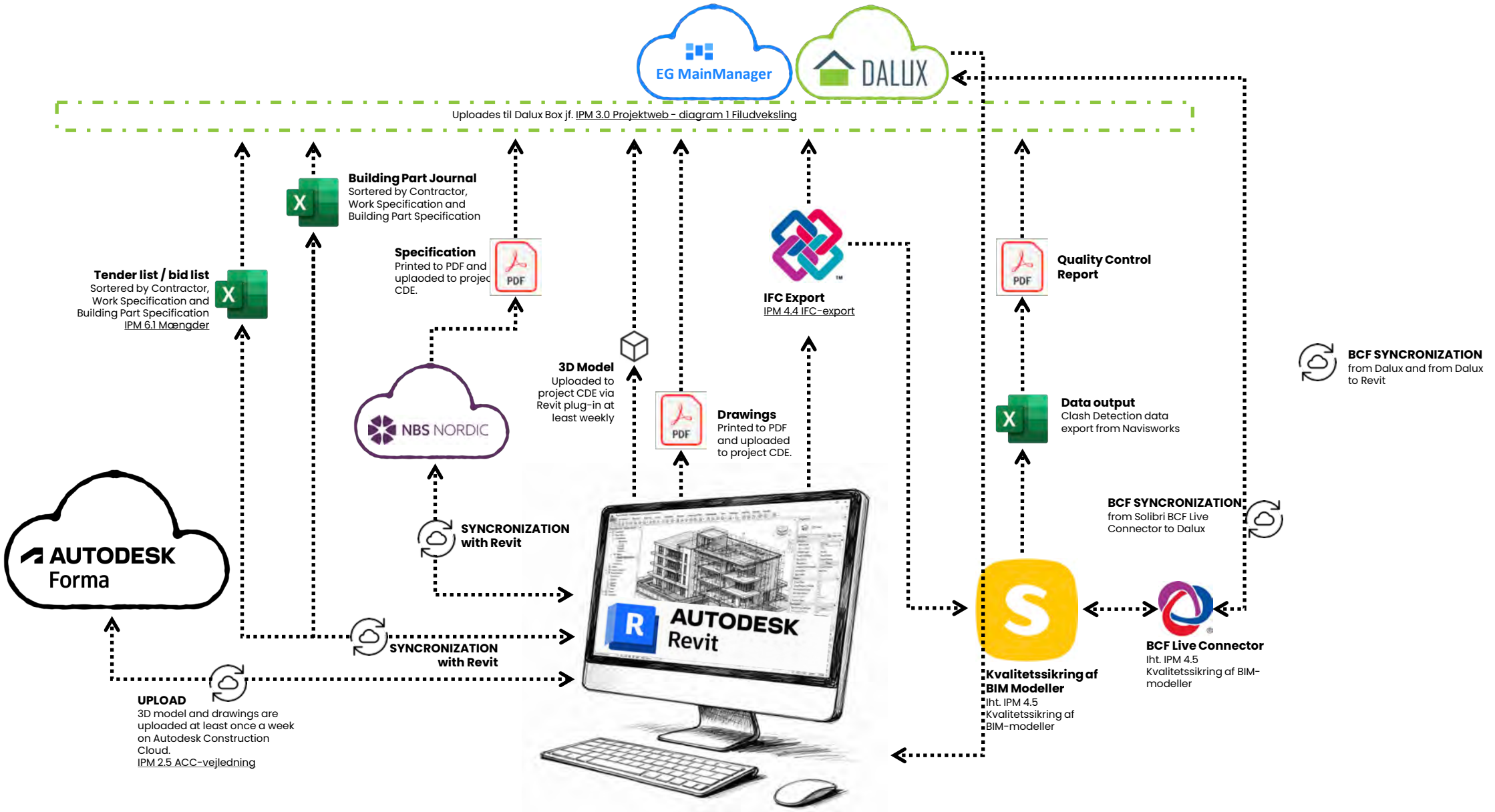
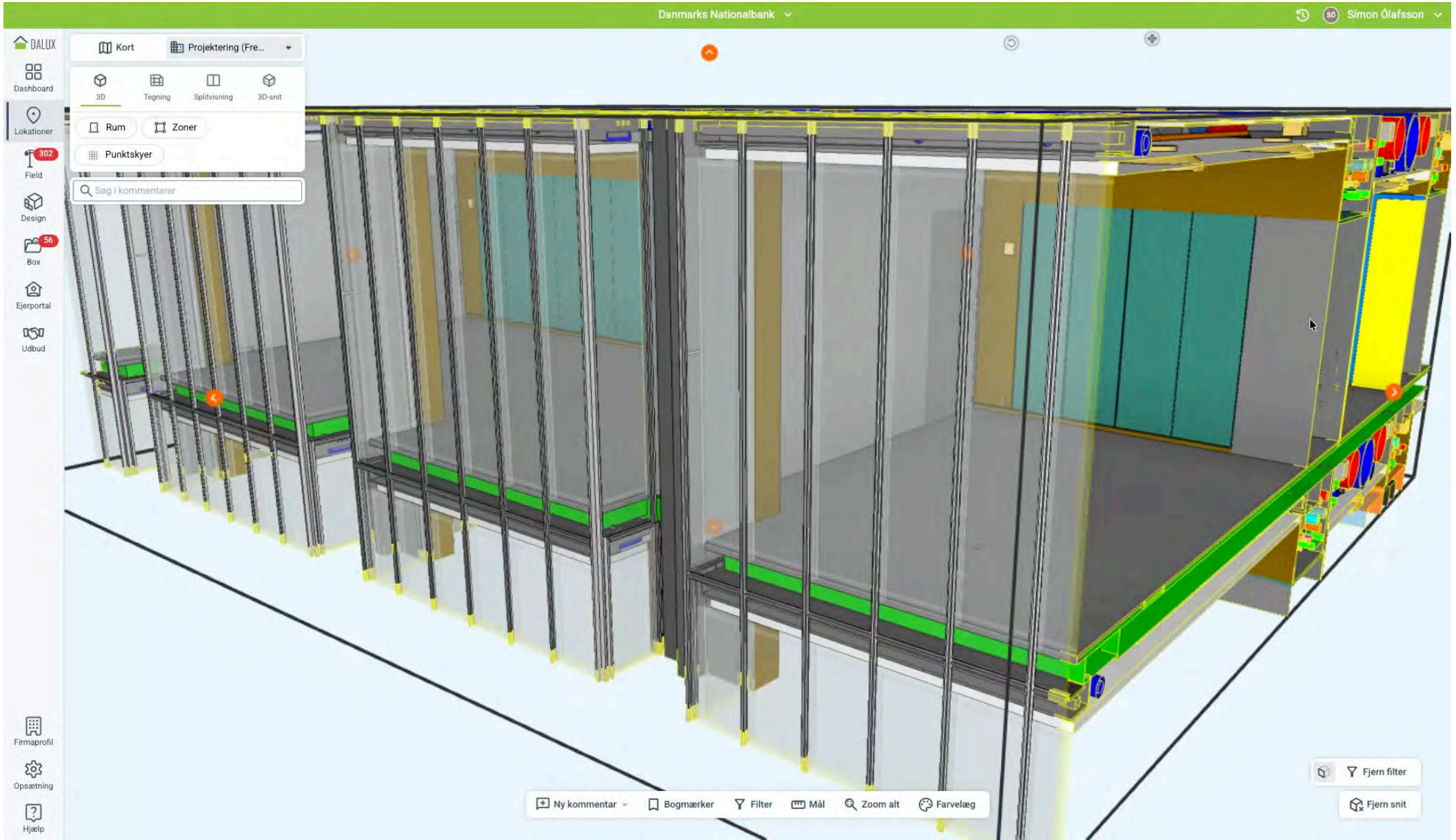


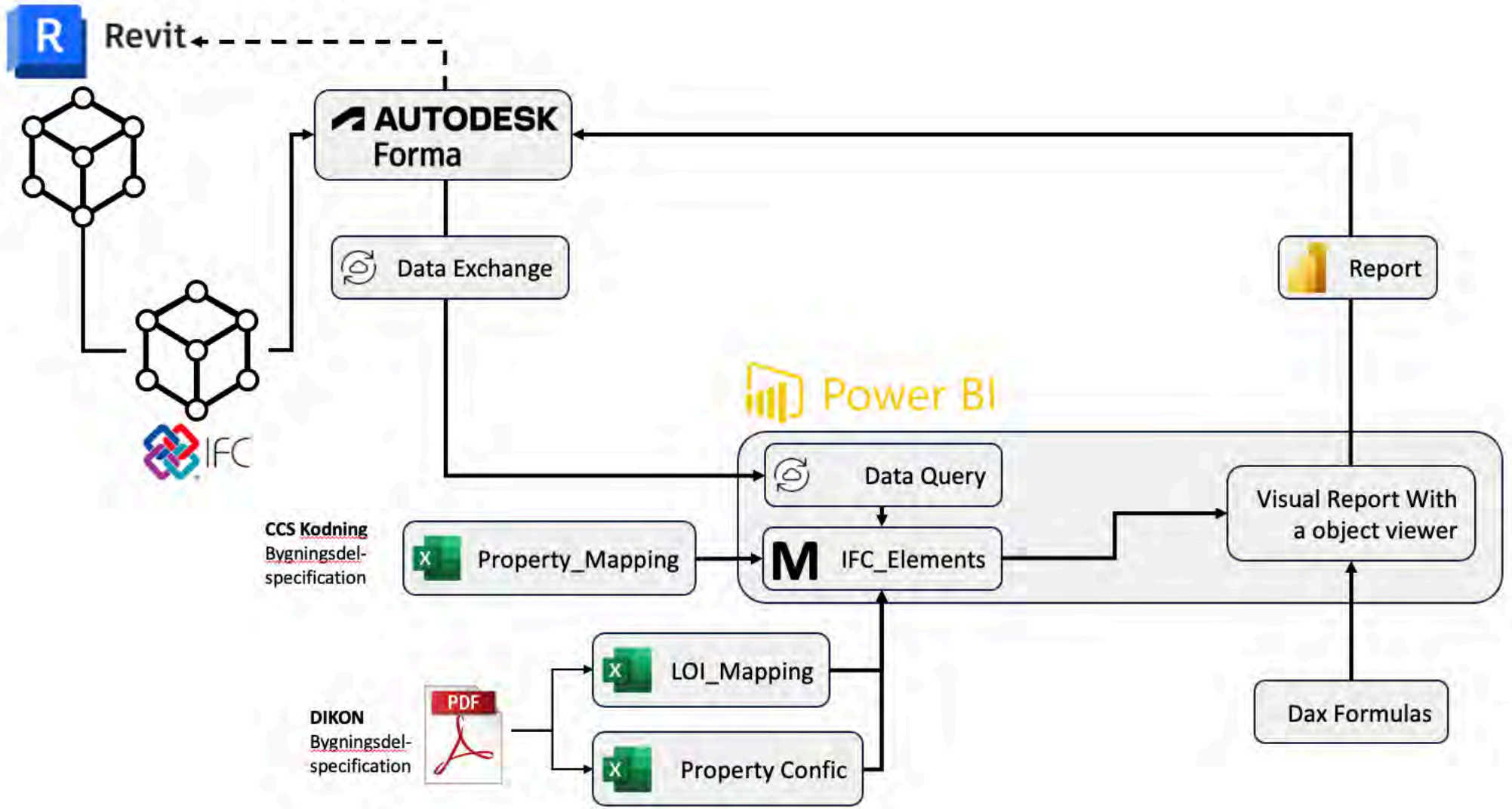
the **CDE > DALUX**

the CDE > DALUX



the SOFTWARE DIAGRAM

Information Delivery Specification Check



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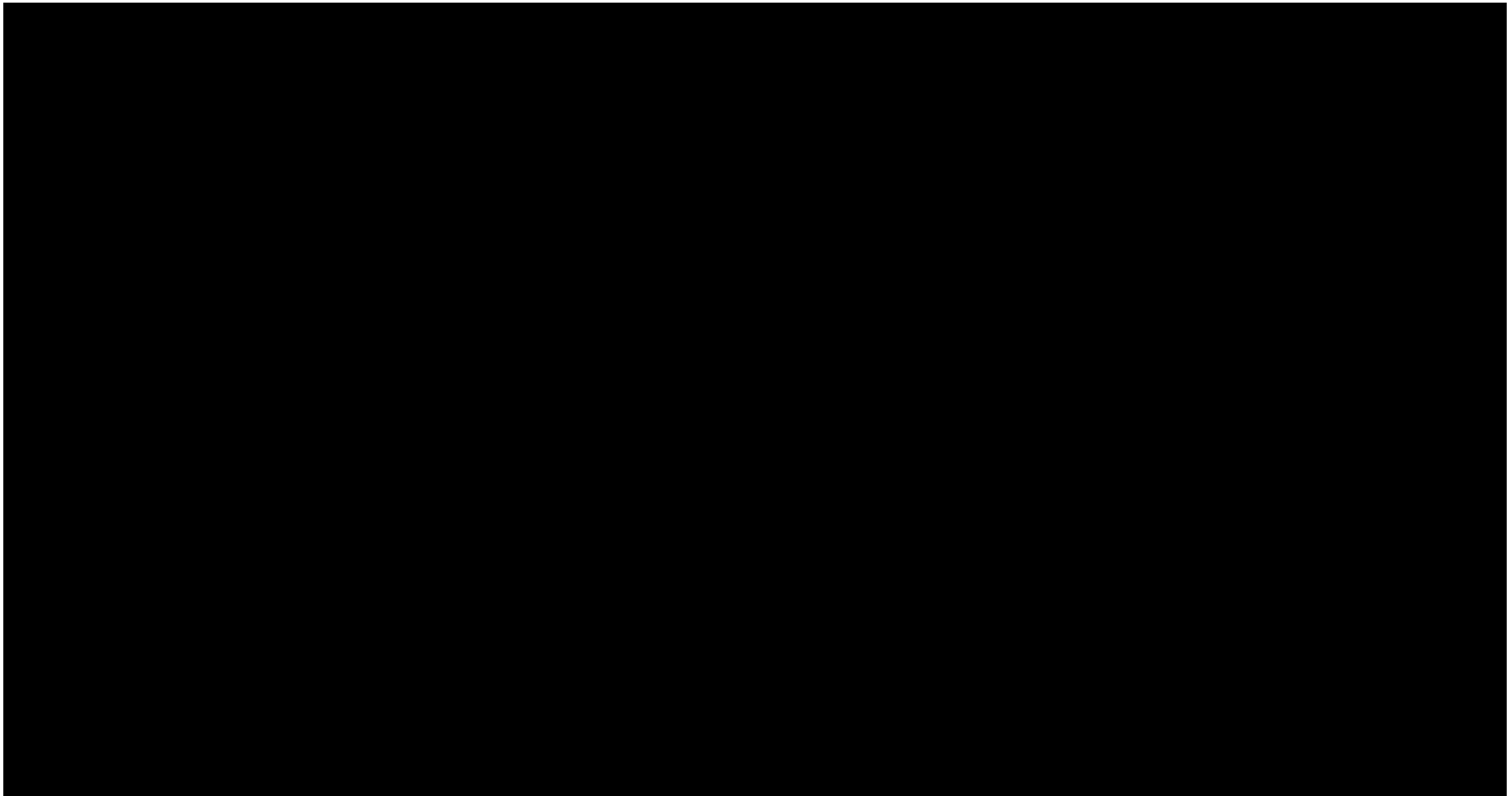
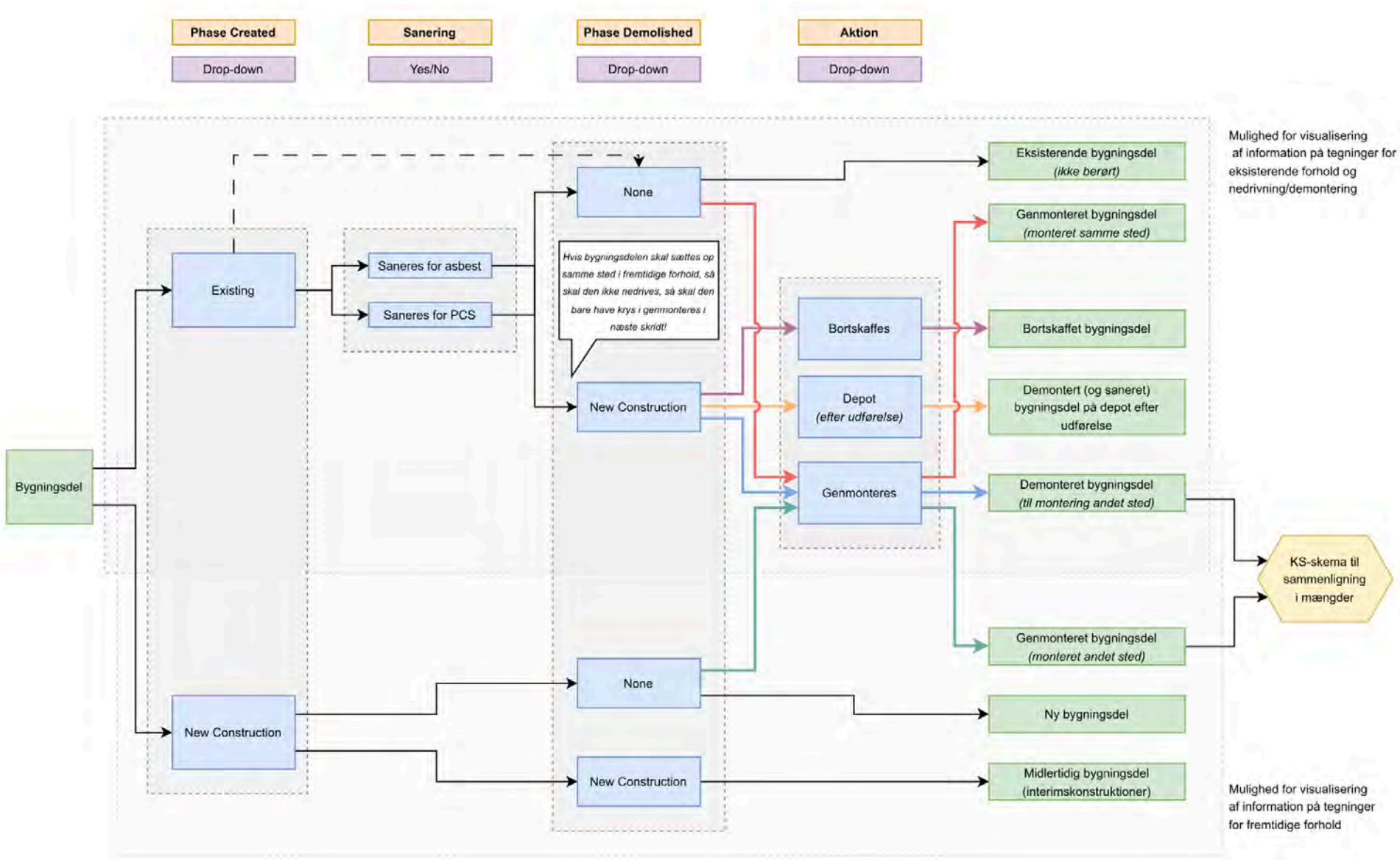
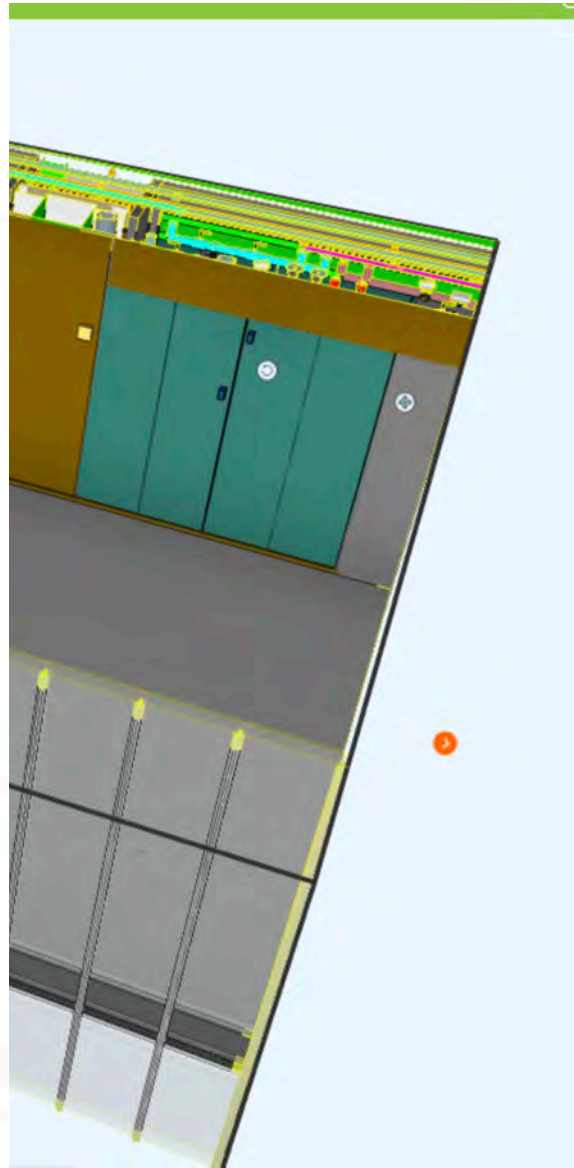
Information Delivery Specification Check



the **3D MODEL**
Data and information Management





the 3D MODEL

Data and information Management via Building Part Journal

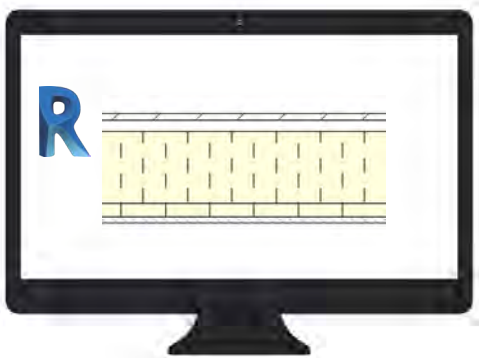
CCS-klassifikation	Bygningsdelsnavn	Måleregel	Måle metode	Data til Drift	Mængde	Enhed
E200.04 Tagopbygning af etape 3 og nedrivning/sanering						
ARB200-04-B360-TAGDÆKNING						
104 Teltoverdækning						
[L]%BE104.001	Montering af teltoverdækning, etape 3 Opsætning, nedtagning, drift og leje af teltoverdækning i hele byggeperioden jf. hovedtidsplan	N1	B	0	1	Pcs.
[L]%BE104.002	Montering af teltoverdækning, etape 2, Sydgård, Opsætning, nedtagning, drift og leje af teltoverdækning i hele byggeperioden jf. hovedtidsplan.	N1	B	0	1	Pcs.
[L]%BE104.003	Telt/sluse til Etape 3	N1	B	0	1	Pcs.
[L]%BE104.004	Levering og montering af midlertidig byggeplads værn på bastionsmur etape 3 inkl. vedligehold og senere demontering	N1	B	0	1	Pcs.
[L]%BE104.005	Tillæg til arbejde og udstyr under miljøsaneringsforhold	N1	B	0	1	Pcs.
[L]%BE104.006	Forankring til faldsikring på etape 3 tag og sydgården etape 2 under udførelsen	N1	B	0	1	Pcs.
243 Inddækning af eksisterende trapper						
[L]%AF243.001	Etape 3 -Spindeltrappe - Demontering/Genmontering	N1	B	C	1	Pcs.
[L]%AF243.002	Etape 2 sydgård - Inddækning af ståltrappe	N1	B	C	1	Pcs.
[L]%AF243.003	Etape 3 Ståltrappe adgang til tag - Demontering/Genmontering af glasværn samt inddækning	N1	B	C	1	Pcs.
273 Lev. og mont. af ny tagopbygning						
[L]%BE273.001	Lev. og mont. af ny tagopbygning etape 2	A1	B	B	1.986,9	m²
[L]%BE273.002	Lev. og mont. af ny tagopbygning etape 3	A1	B	B	5.304,1	m²
[L]%BE273.003	Lev. og mont. af ny tagopbygning lokalt ved forstøbninger etape 1	A1	B	B	0	m
[L]%BE273.004	Tagpap lokalt ved forstøbninger etape 1	?	?	?	1	Pcs.
[L]%BE273.005	Tætning og lukning af huller efter stål ben op gennem tag	N1	B	0	1	Pcs.
274 Glasbølger, Etape 2, Sydgård						
[L]%QQA274.001	Demontering/Afrensning/Genmontering - Glasbølger i sydgård etape 2	N1	B	B	4	Pcs.
279 Levering og montering af luftgårde						
[L]%BE279.001	Luftgård 04 - Levering og montering af luftgård	A1	B	B	0	pcs
[L]%BE279.002	Luftgård 05 - Levering og montering af luftgård	A1	B	B	0	pcs
[L]%BE279.003	Luftgård 07 - Levering og montering af luftgård	A1	B	B	0	pcs
[L]%BE279.004	Luftgård 08 - Levering og montering af luftgård	A1	B	B	0	pcs
372 Levering og montering af ovenlys						
[L]%QQA372.005	NOB - Nyproduceret ovenlys med brandglas, Etape 3	N1	B	C	35	Pcs.
[L]%QQA372.006	RO - Renoveret ovenlys, Etape 3	N1	B	C	135	Pcs.
[L]%QQA372.007	NO - Nyproduceret ovenlys, Etape 3	N1	B	C	10	Pcs.
373 De- og genmontering skyggehætter til ovenlys						

the 3D MODEL
Data and information Management

CLASSIFICATIONmade**EASY**
brought to you by **IKT**ECH aps

Fil indeholder Dynamo-graph der;

1. Oprette brancheparametre ud fra SharedParameter filer.
2. Læser mappingtabellen og skriver værdierne ud på rigtige parametre



Revit Type Name
224 Skeletkonstrueret væg 145 mm

BIM7AATypeCode	224
BIM7AATypeDescription	Skeletkonstruerede vægge
BIM7AATypeNumber	xxx
BIM7AATypeComments	Gipsvæg 145 mm
BIM7AATypeID	224004
BIM7AATypeName	224004 Gipsvæg 145 mm

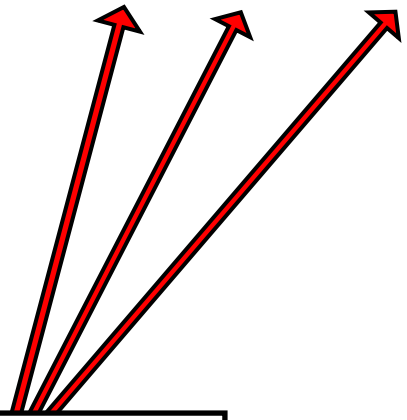
Excel-fil med indeholdt mapping tabel for:
BIM7AATypekodning > CCS Klassifikation
BIM7AATypekodning > IFC2x3
BIM7AATypekodning > IFC4
BIM7AATypekodning > Forvaltningsklassifikation
BIM7AATypekodning > SfB 1988
BIM7AATypekodning > Entreprise
BIM7AATypekodning > Arbejdsbeskrivelse
BIM7AATypekodning > Bygningsdelsbeskrivelse

Tilbudsliste
Sorteret efter Entreprise, Arbejdsbeskrivelse og Bygningsdelsbeskrivelse

the 3D MODEL CLASSIFICATIONmadeEASY with Dynamo

1 Choose a key
i.e. BIM TypeCode

2 Fill that value into your Revit model
…maybe it´s part of your company standard.

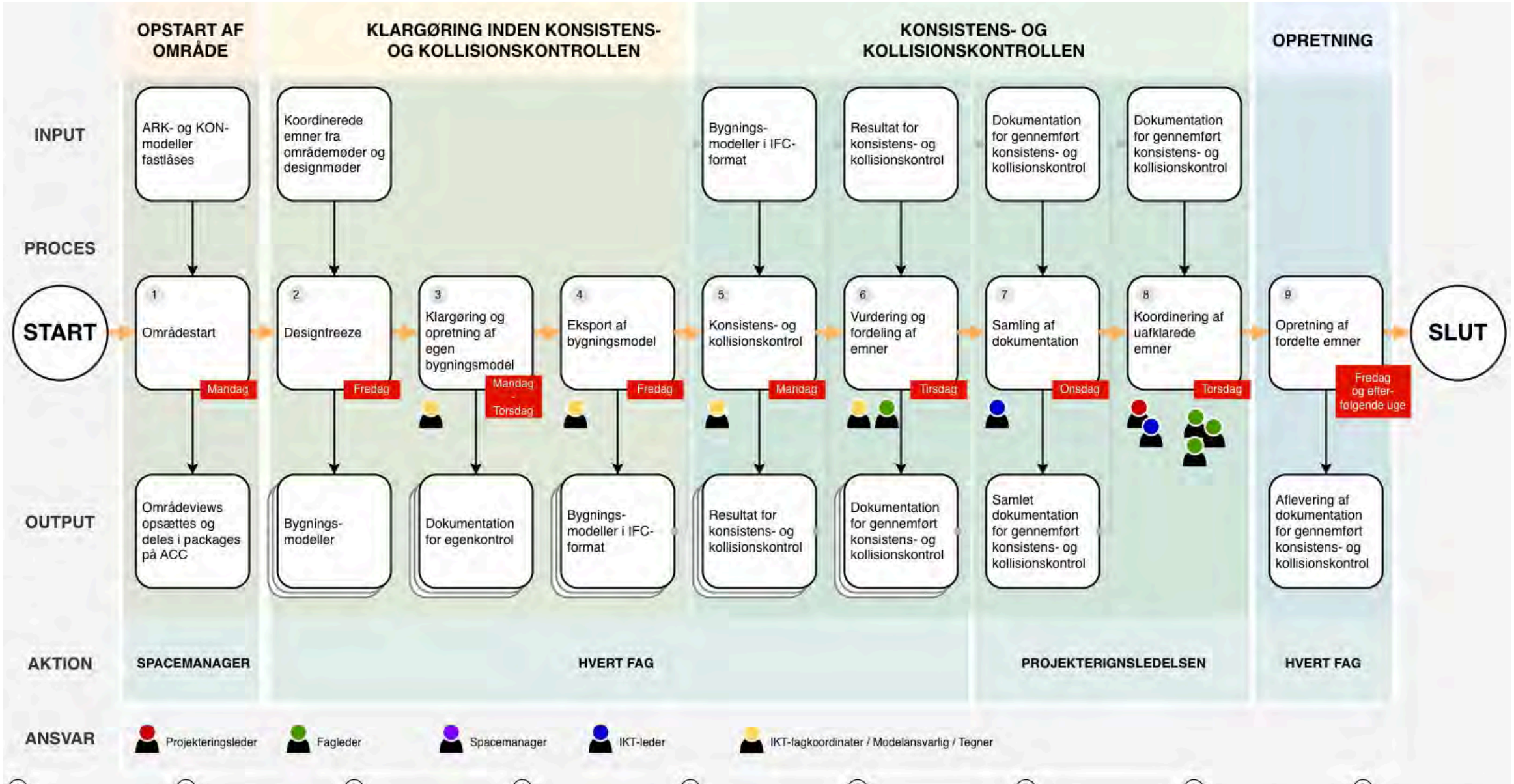


3 Setup in Dynamo what values you want into your Revit model

4 RUN DYNAMO PLAYER

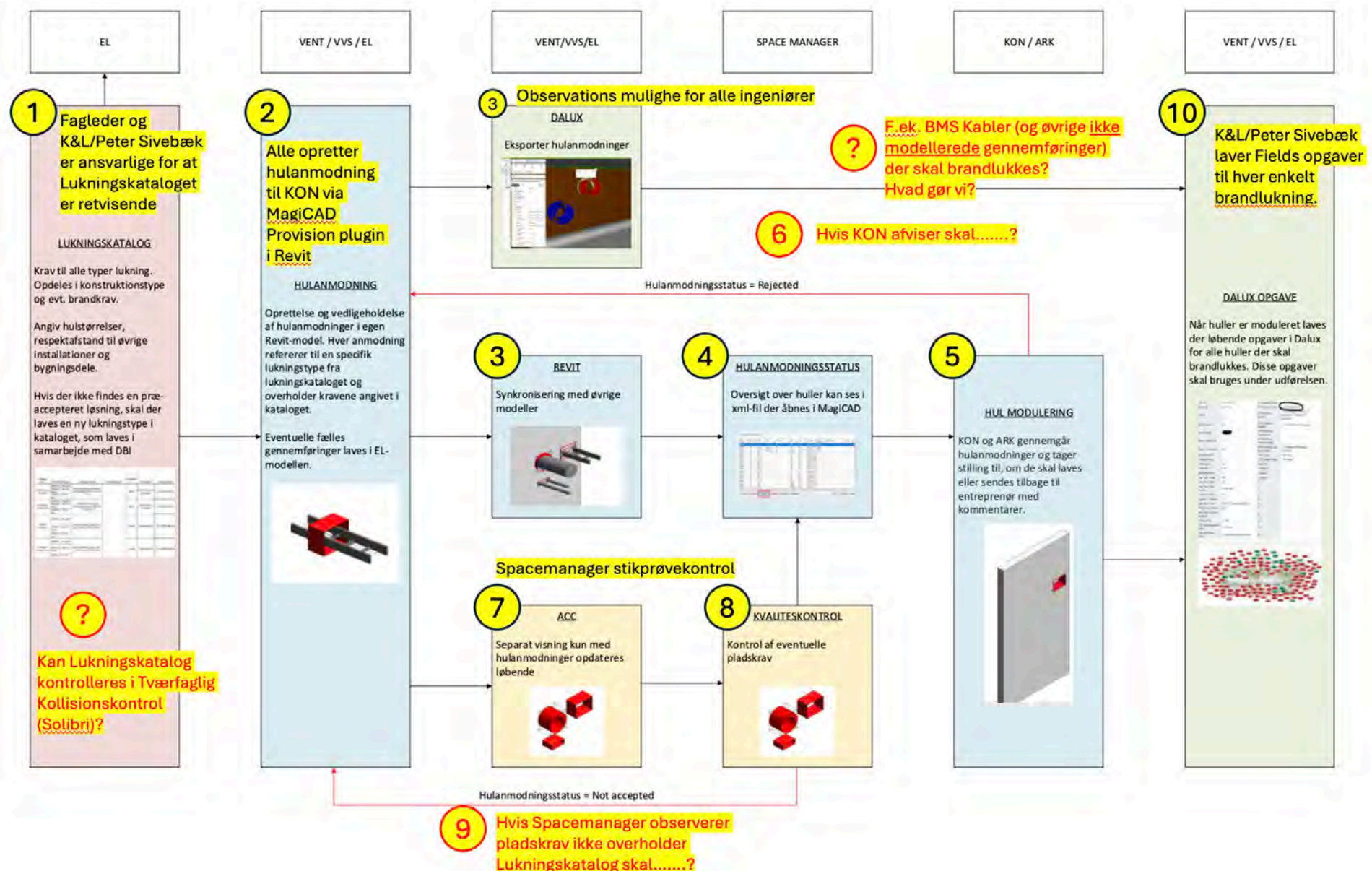
the **QUALITY CONTROL**

Proces for Consistency Control (CC) / Clash Detection (CD)



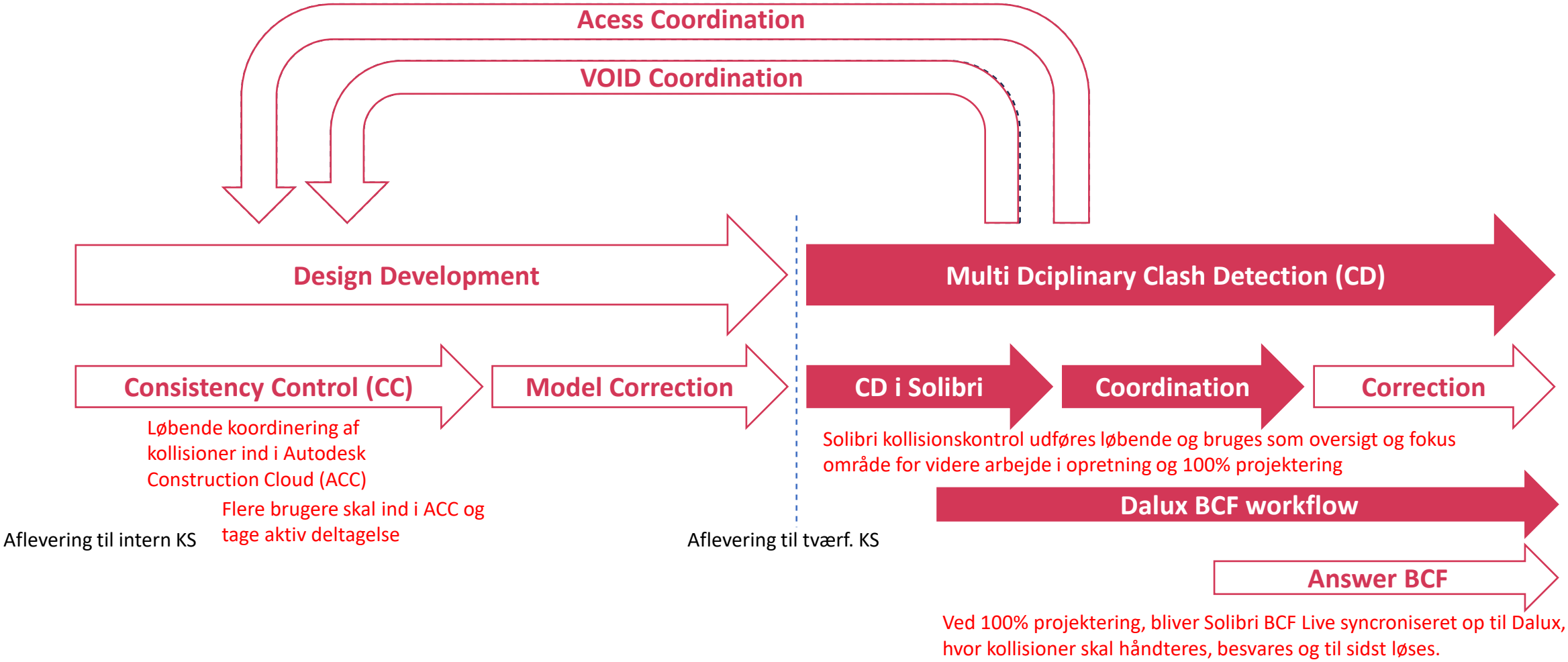
the QUALITY CONTROL

Proces for VOID Coordination / Acess Coordination



the QUALITY CONTROL

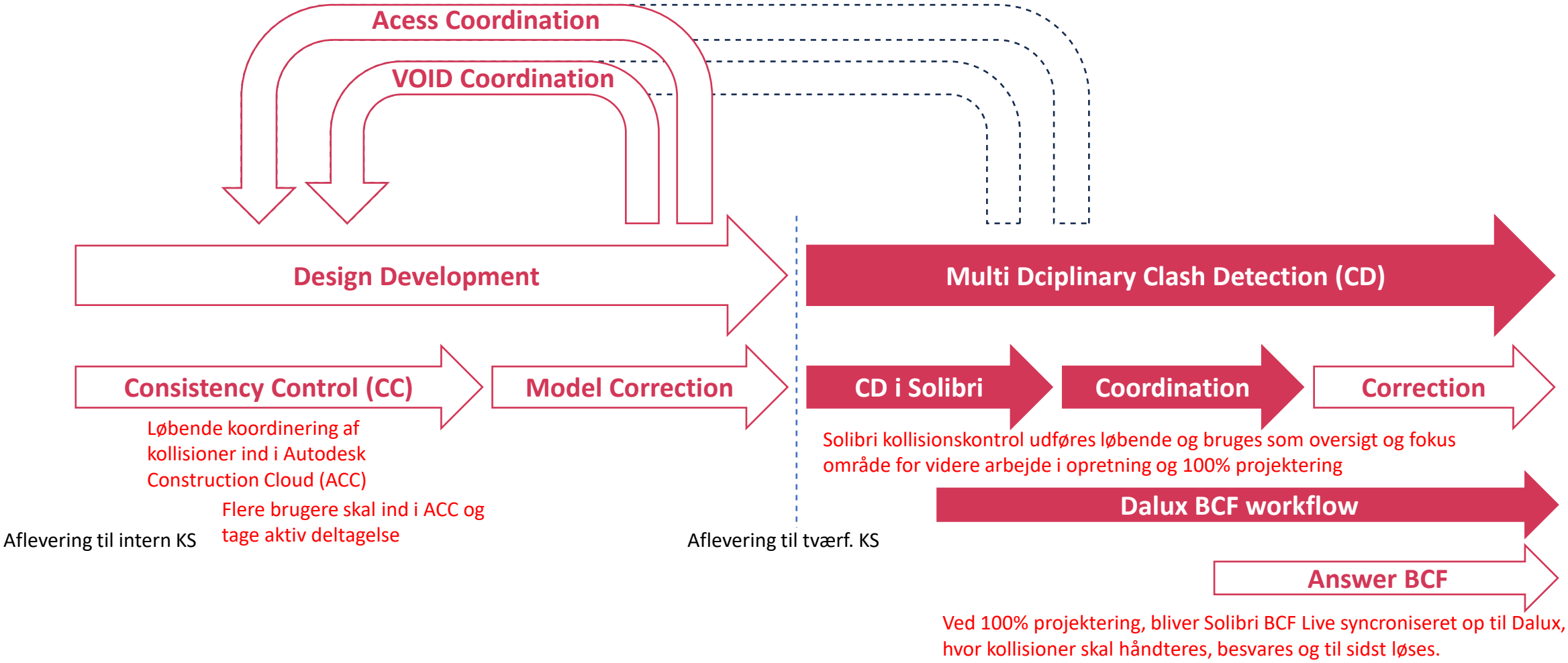
Proces for Consistency Control (CC) / Clash Detection (CD)



En for alle og alle for en!

the QUALITY CONTROL

Proces for Consistency Control (CC) / Clash Detection (CD)



One for All and All for One!


QUESTIONS?