

DIGITALISERING FRA DESIGN TIL PRODUKTION

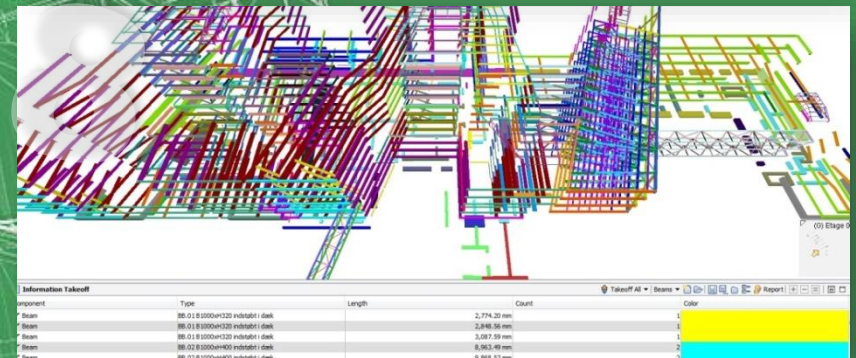
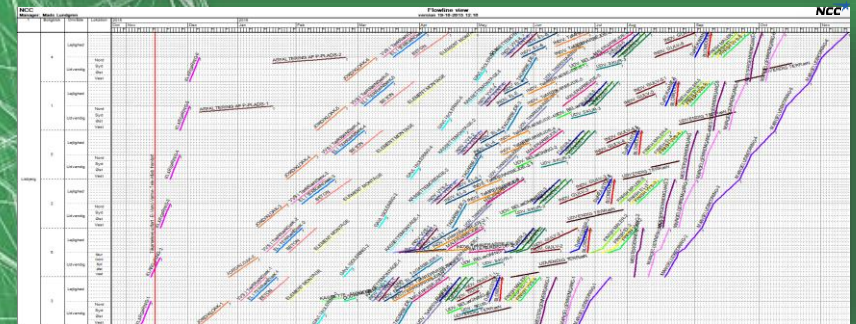
Casper Gullach, NCC

2018



AGENDA

- VDC hos NCC
- Inddragelse i designfasen
- Forberedelse inden produktion
- VDC i produktion
- Mål og udfordringer



Involvering af VDC på vores projekter:

Totalentrepriser:
97%

Hovedentrepriser:
100%

Tilbud:
100%



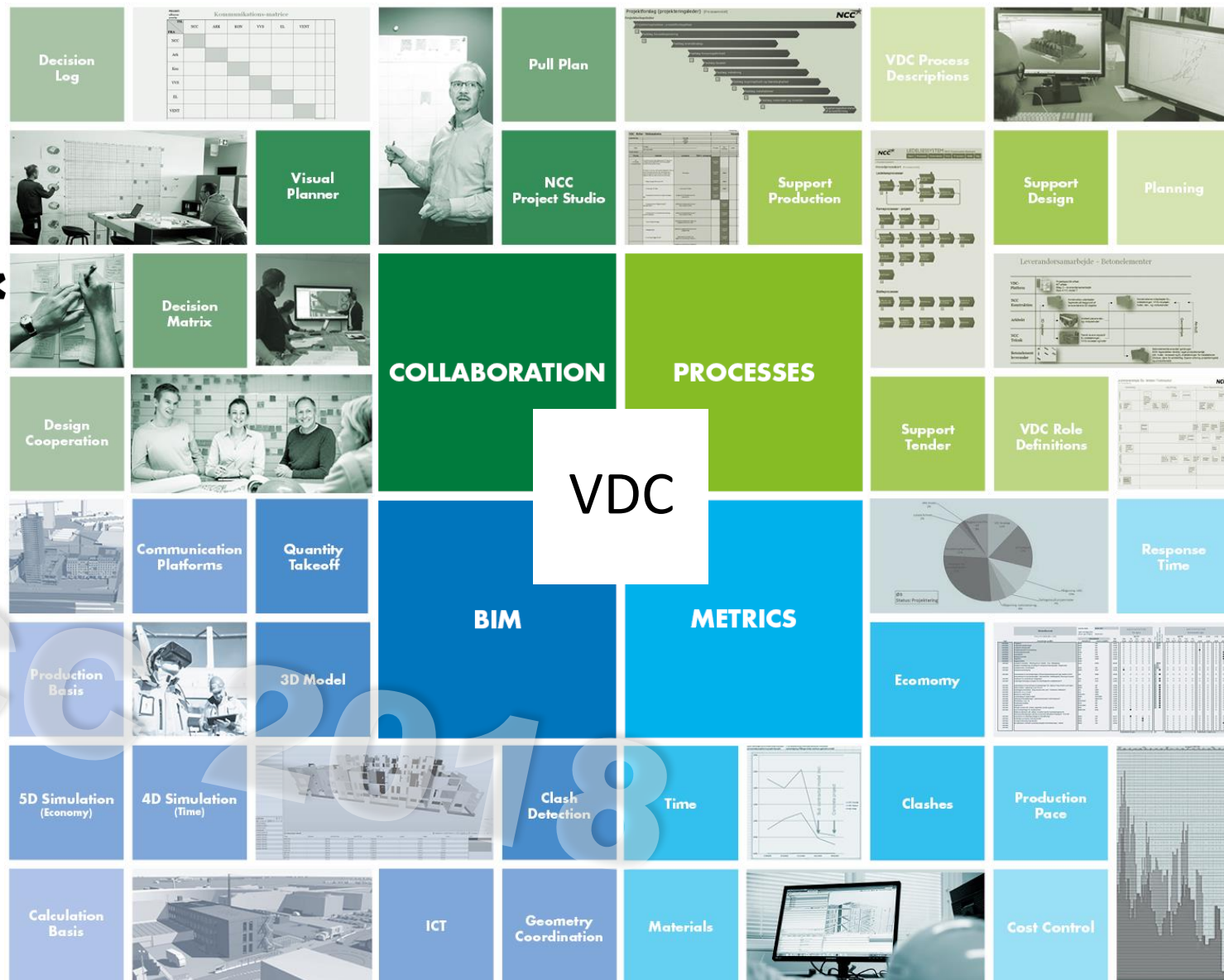
VDC er for alle

Hele værdikæden skal være digital...
...med digitale kompetencer i alle led!



Vores definition

Sammenhængen mellem...



Samarbejde:

Hvordan vi arbejder sammen med vores samarbejdspartnere på projekter, eksempelvis i NCC Project Studio

Processer:

Hvordan vi arbejder strategisk inden for design, planlægning og produktion, samt sammen med leverandører

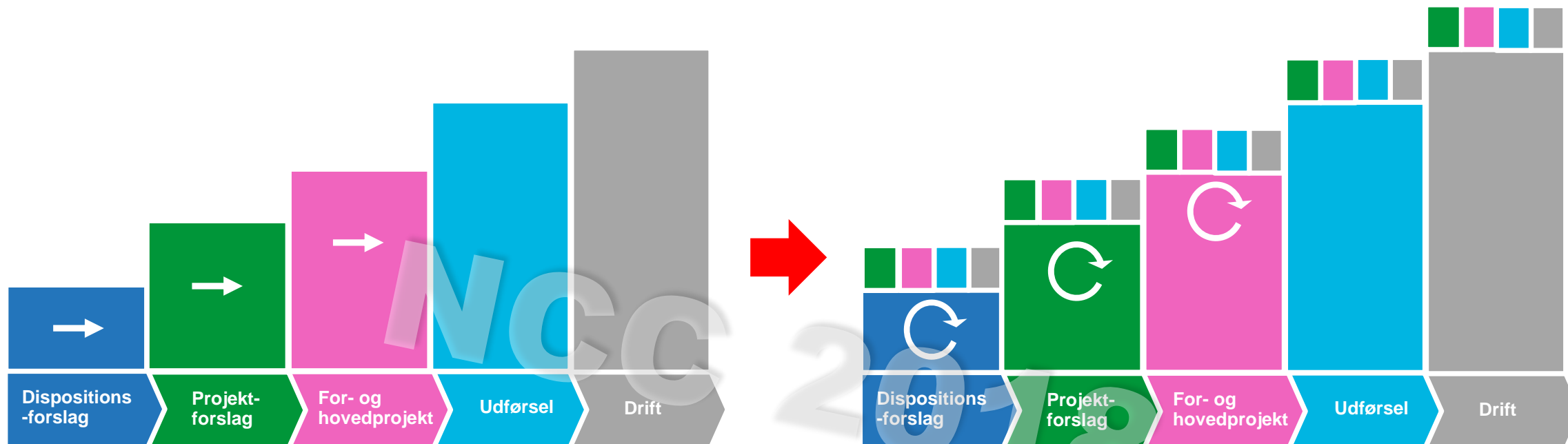
BIM:

Hvordan vi anvender digitale værktøjer til simulering af bl.a. tid og økonomi, samt koordinerer vores projekter

Metrics:

Hvordan vi måler og benchmarker værdiskabelsen af vores handlinger og løbende forbedrer os

Designprocessen er ikke lineær...



Den traditionelle designproces...

- Løbende detaljering og faglig inddragelse i takt med projektets udvikling.
- Entreprenør og leverandør inddrages ved (næsten) færdigt design – når udførelsen påbegyndes

...Den effektive designproces

- Faglig viden, eksempelvis fra leverandører, udførende entreprenør samt drift inddrages som del af beslutningsgrundlaget tidligt.
- Fokus på at beslutninger træffes på et helhedsorienteret grundlag

Fokusområde

Design



Produktion

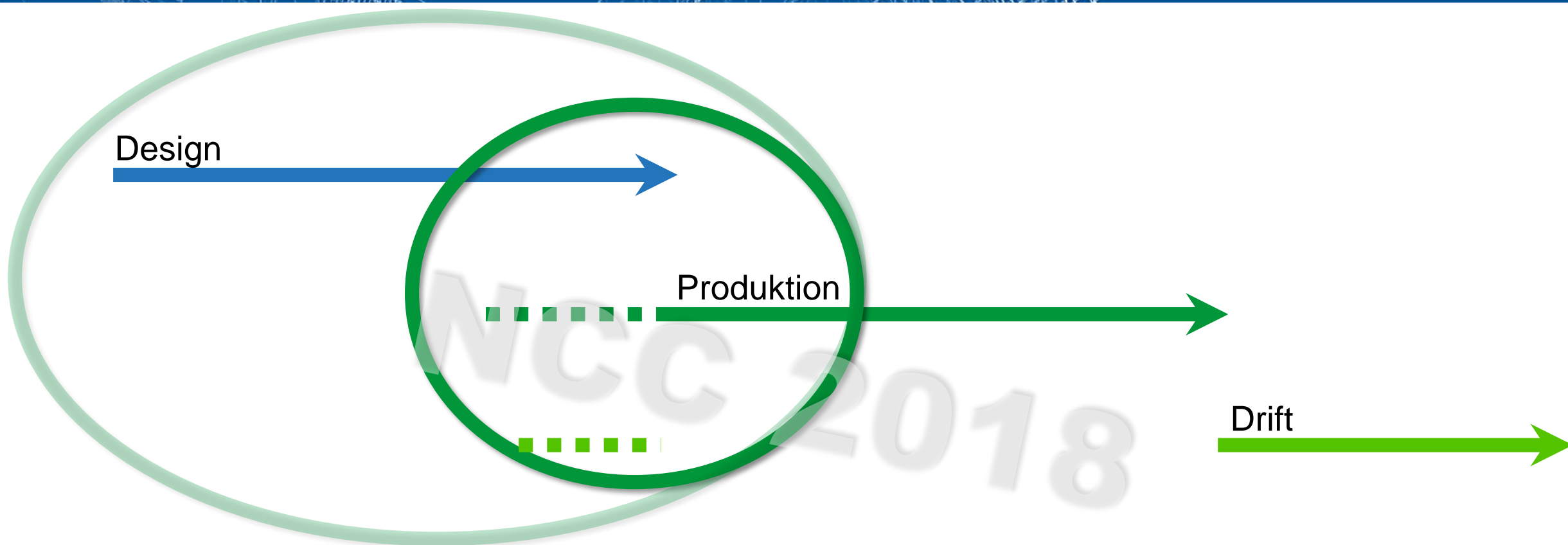


Drift


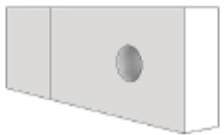
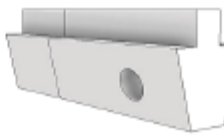



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Fokusområde



Forventningsafstemning

DiKon							
Building element	Concrete beam						
Description	Applies to site-cast and prefabricated concrete beams						
Revision date	10-09-2016						
	Inf. 1	Inf. 2	Information level 3	Information level 4	Information level 5	Information level 6	Inf. 7
Geometry							
			Beams are modelled as generic objects in max. outer contour broken down into overall types. Expected main geometry, orientation and location.	Beams are modelled in specified main dimension, orientation and location. Larger holes for main lead-throughs with specified size and location.	Beams are modelled in final dimension, element length, orientation and location and in producible lengths. Final brackets and holes for lead-throughs.	Beams are modelled in final dimension, production length, orientation and location. Final brackets, holes for lead-throughs, joints, reinforcement incl. supports, mounting points, bevels and insert plates.	
Mandatory attributes			Cros section Classification Type name	Cros section Classification Type name Type Construction type	Cros section Location (e.g. building number or floor) Classification Type name Type Construction type	Cros section Location (e.g. building number or floor) Classification Type name Type Serial number Construction type	

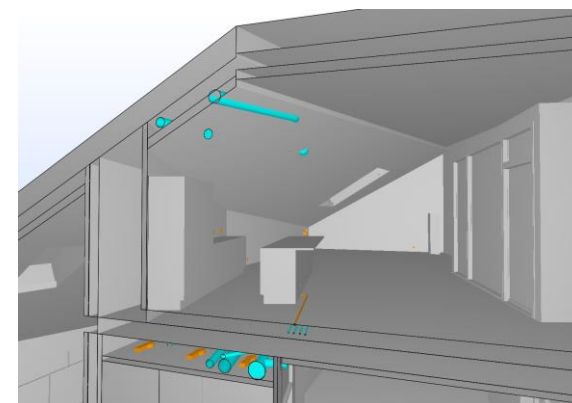
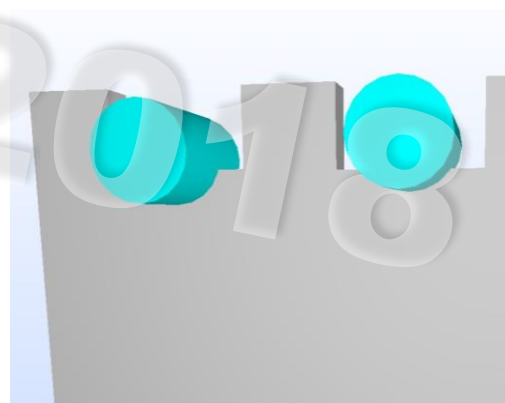
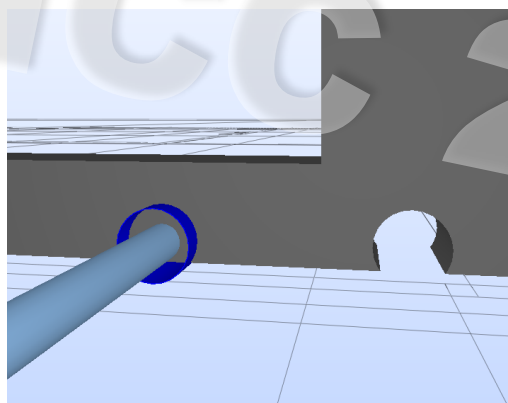
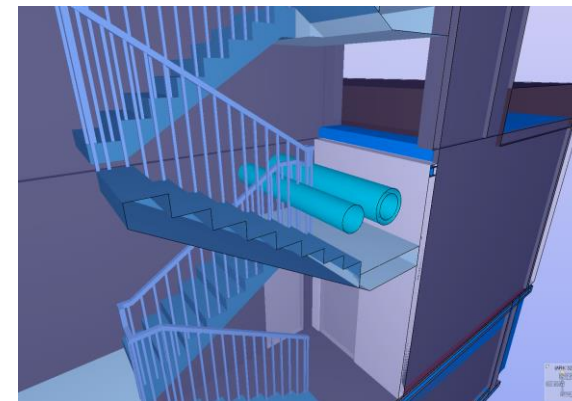
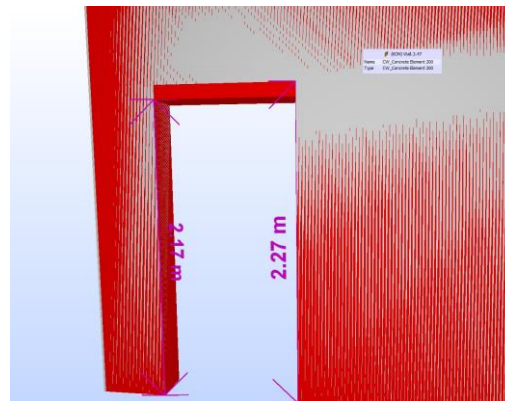
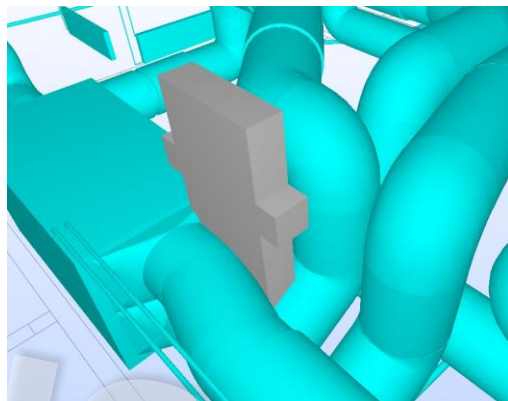
Inddragelse i designfasen

NCC 2018

Gennemgang af 3D modeller og projektmateriale

Bygbarhed

- Kollisionskontrol
- Modelsammenligning
- Visuel granskning



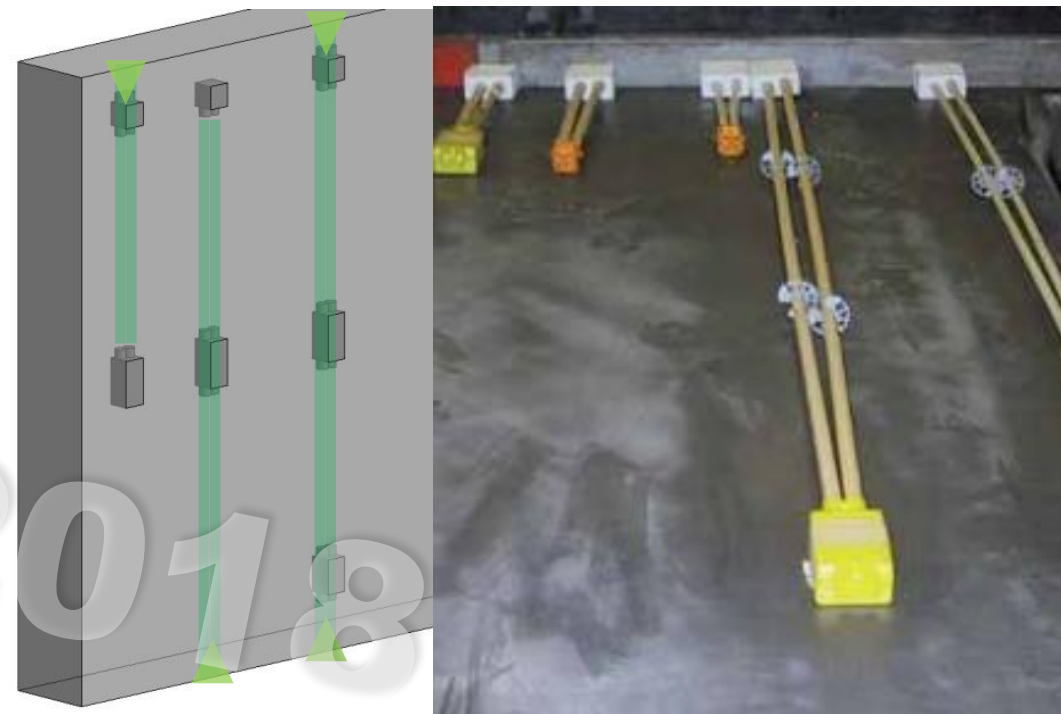
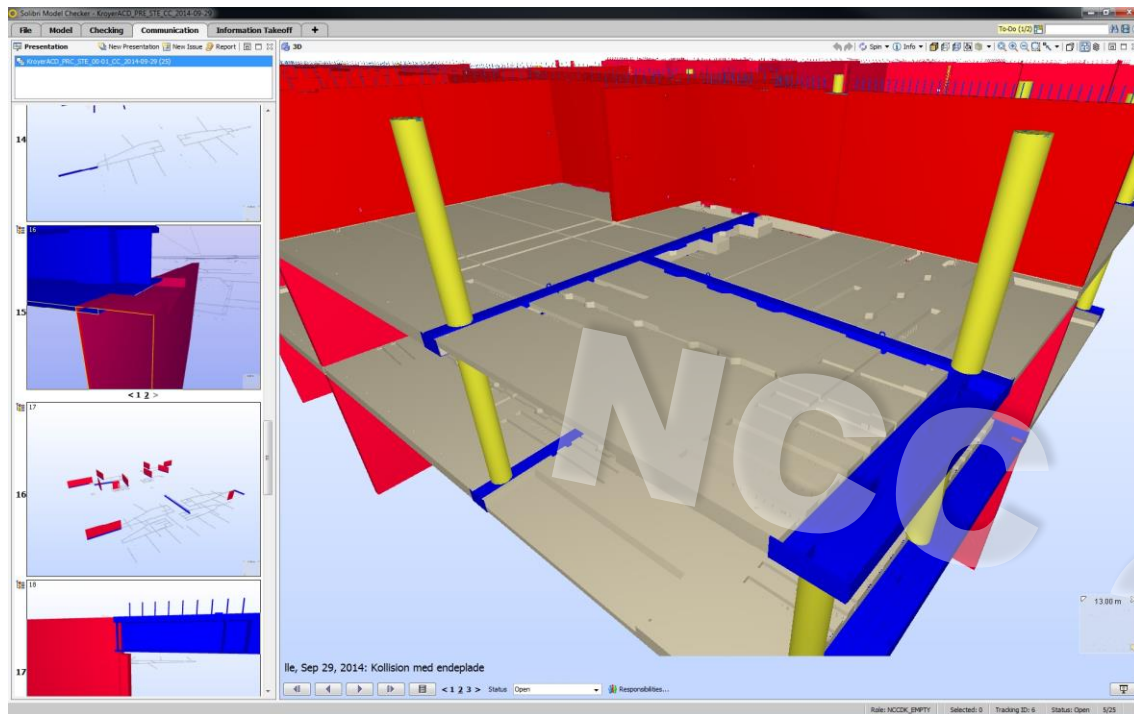
Bedre beslutningsgrundlag



VR-teknologi:

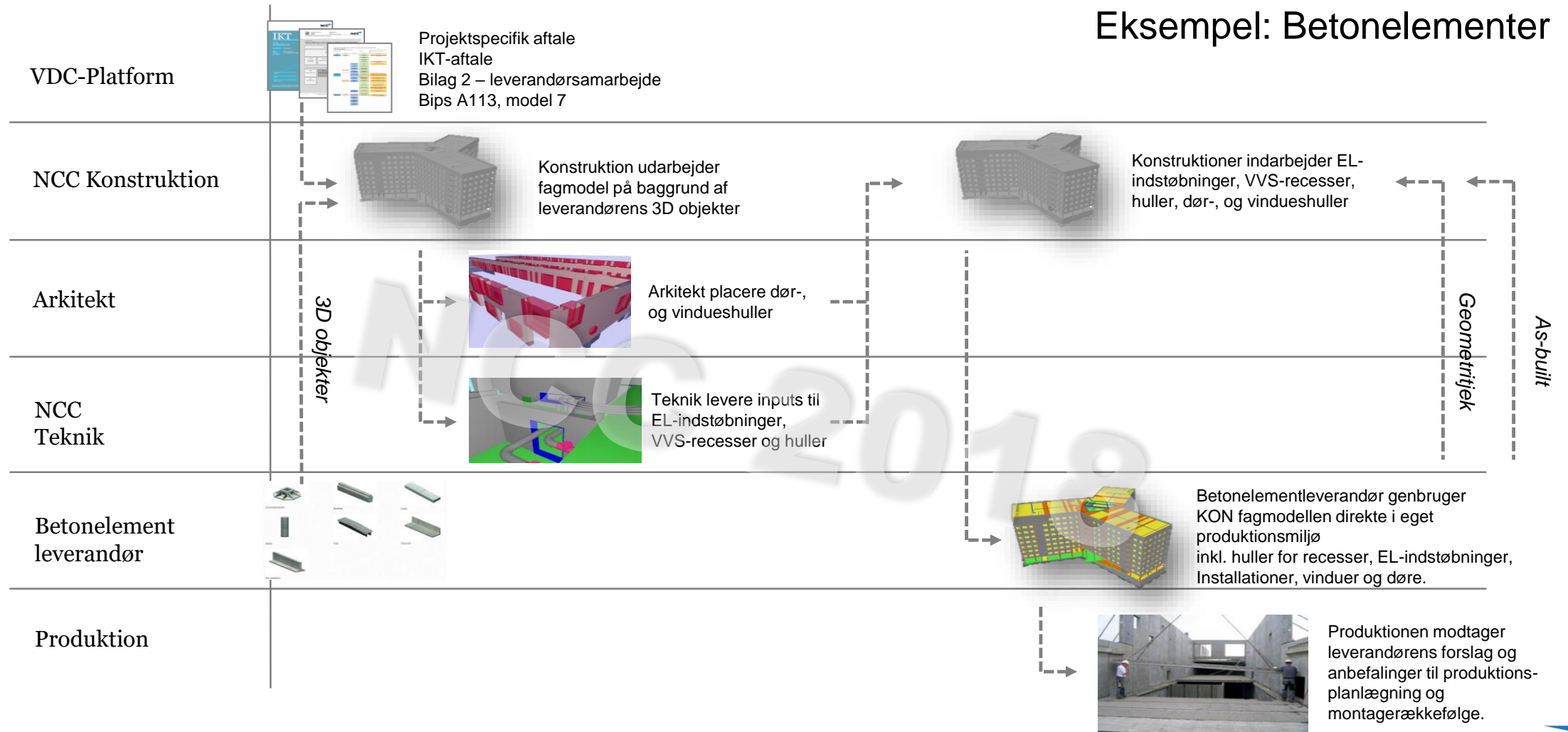
- Realtime visualisering i sketchmode giver hurtigt overblik
- Fotorealistiske renderinger for at se de færdige resultat

3D leverandørsamarbejde



Inddrag leverandører og entreprenører effektivt

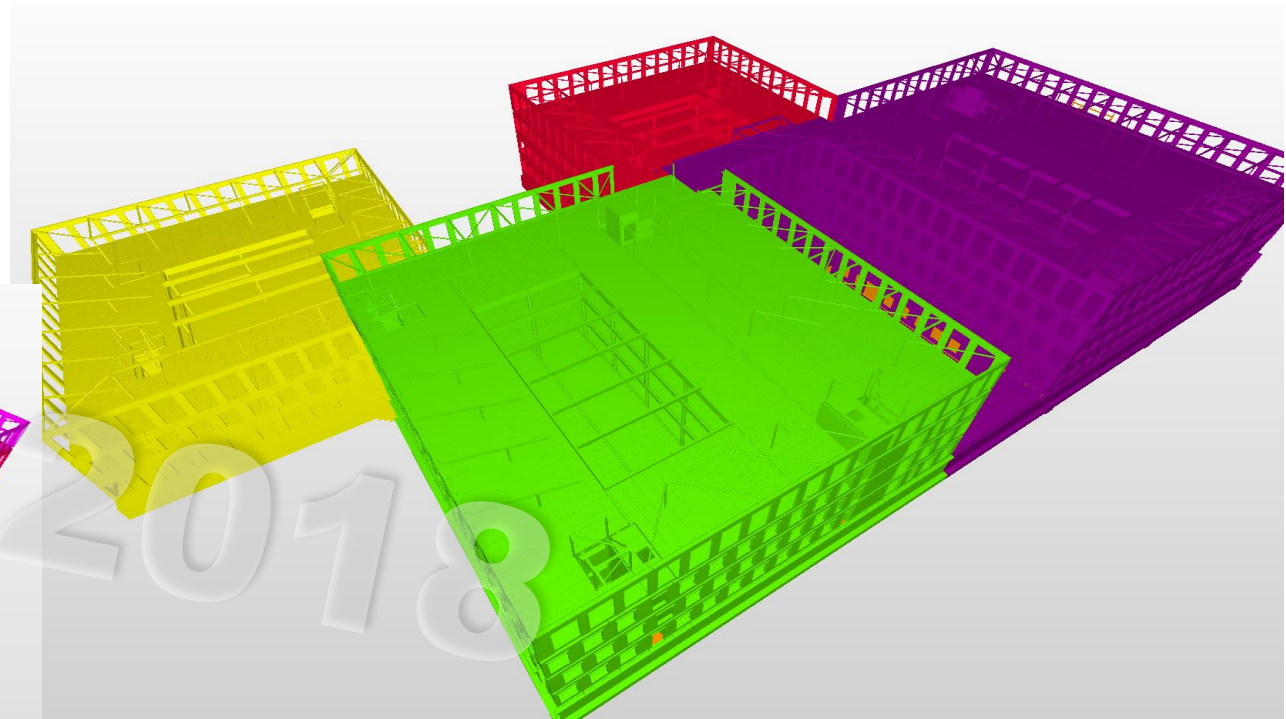
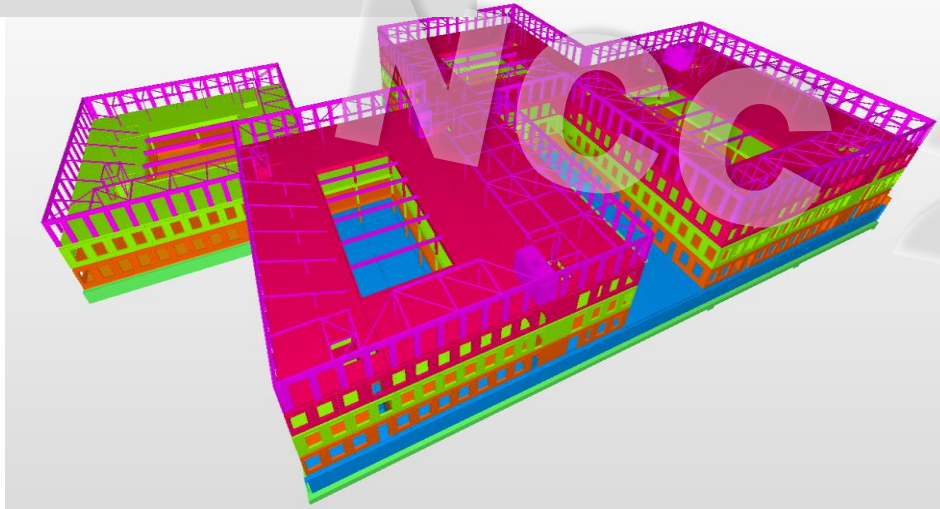
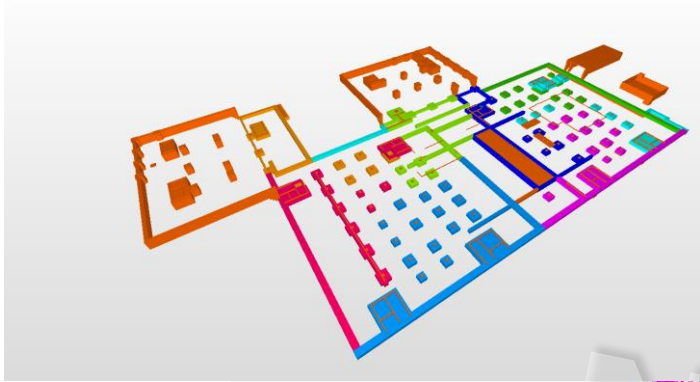
Eksempel: Betonelementer



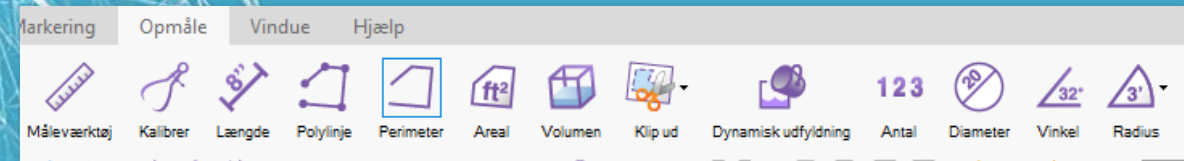
Forberedelse inden produktionen

MCC 2018

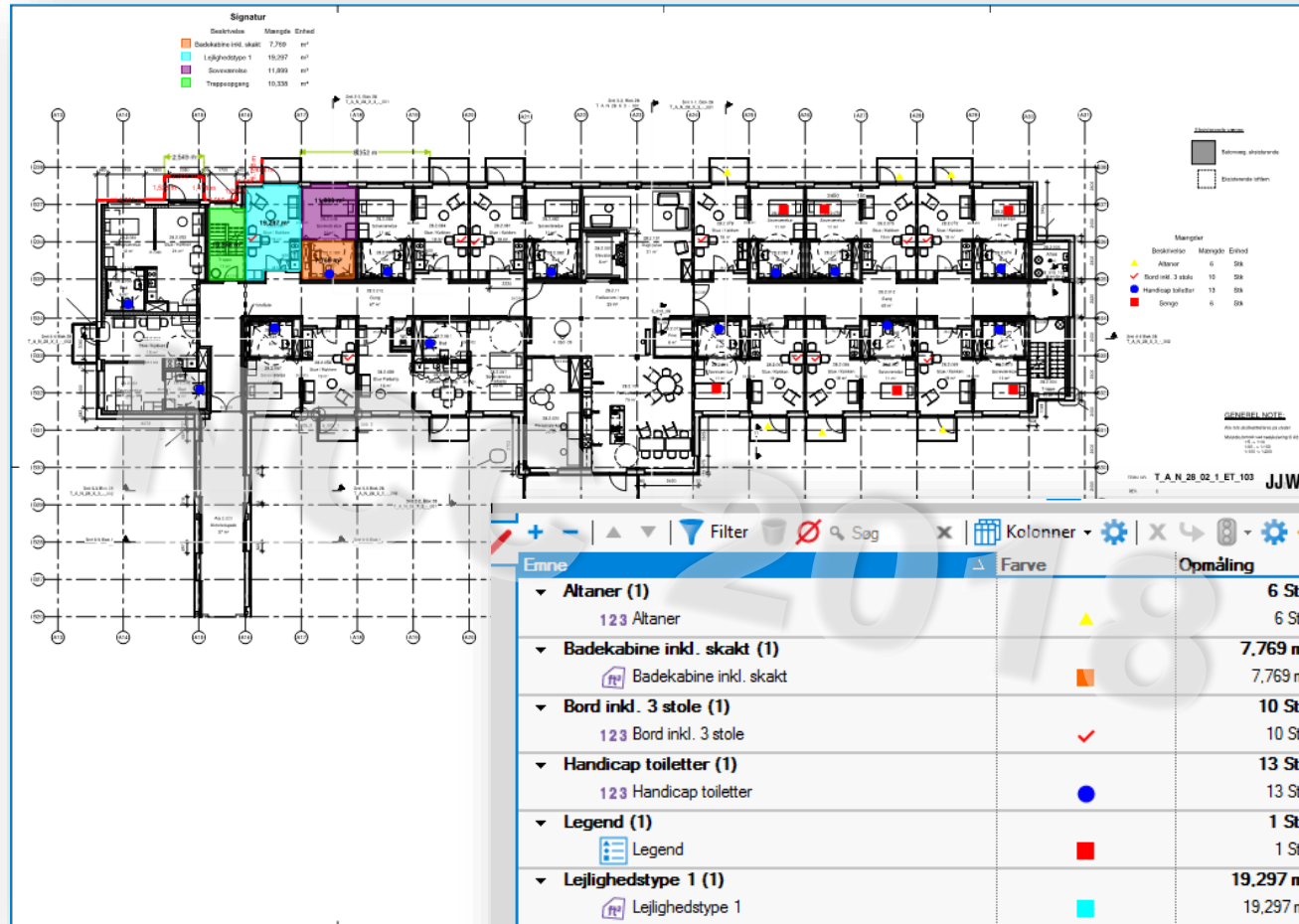
Databerigelse af modeller



Mængder



- Arealer
- Volumen
- Diameter
- Radier
- Vinkler
- Længde
- Perimeter
- Antal



Emne	Farve	Opmåling	Sideetiket	Dato
▼ Altaner (1)		6 Stk		
123 Altaner	▲	6 Stk	1	06-06-2017 12:40:21
▼ Badekabine inkl. skakt (1)		7.769 m ²		
Badekabine inkl. skakt	■	7.769 m ²	1	06-06-2017 07:35:12
▼ Bord inkl. 3 stole (1)		10 Stk		
123 Bord inkl. 3 stole	✓	10 Stk	1	06-06-2017 07:39:12
▼ Handicap toiletter (1)		13 Stk		
123 Handicap toiletter	●	13 Stk	1	06-06-2017 07:40:15
▼ Legend (1)		1 Stk		
Legend	■	1 Stk	1	06-06-2017 12:51:41
▼ Lejlighedstype 1 (1)		19.297 m ²		
Lejlighedstype 1	■	19.297 m ²	1	06-06-2017 07:34:43
▼ Længdemåling (2)		10.901 m		
Længdemåling	■	8.352 m	1	06-06-2017 07:36:13
Længdemåling	■	2.549 m	1	06-06-2017 07:36:27

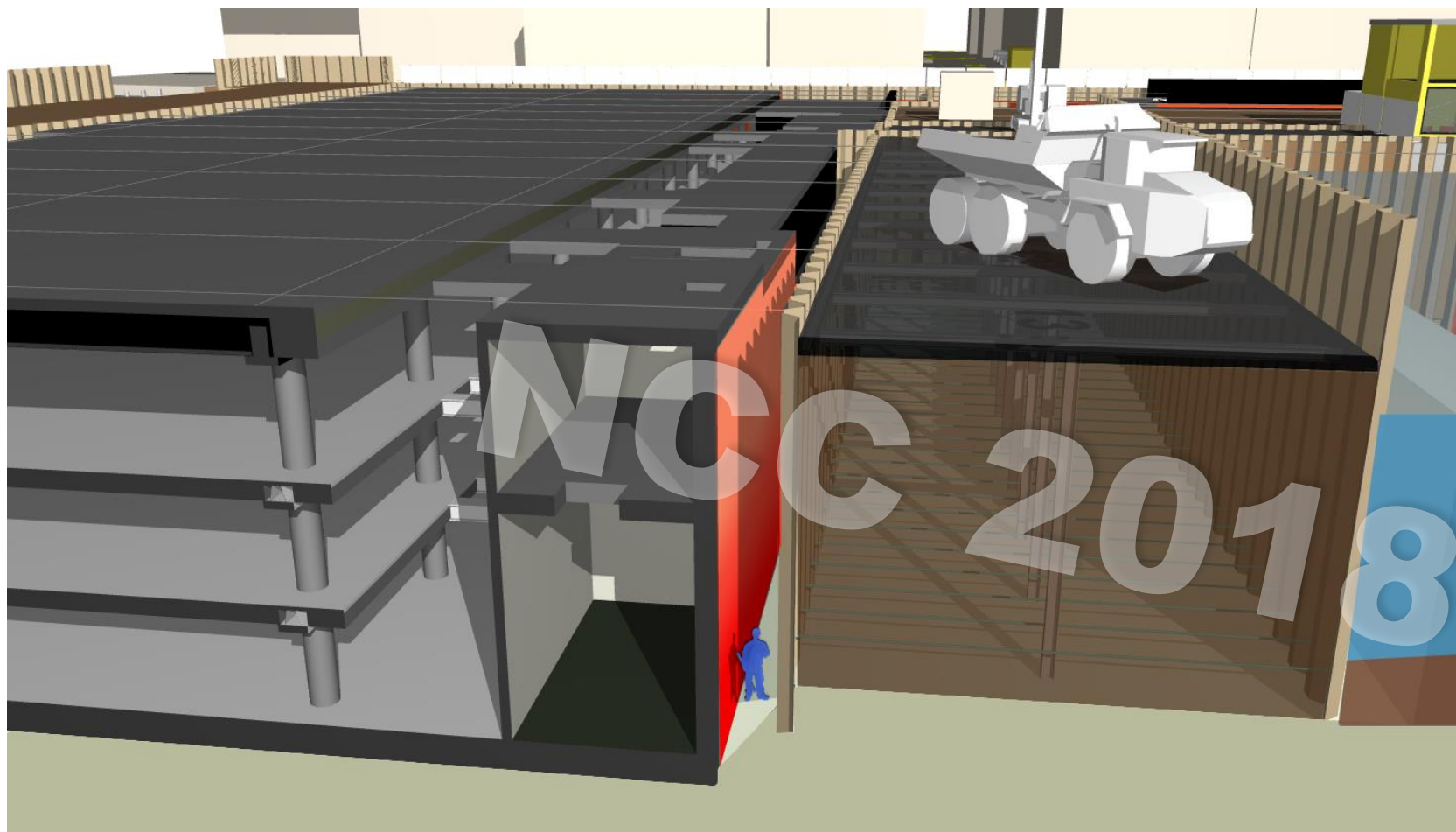
Trække mængder smart og effektivt ud af PDF-tegninger

ANTAL STK.

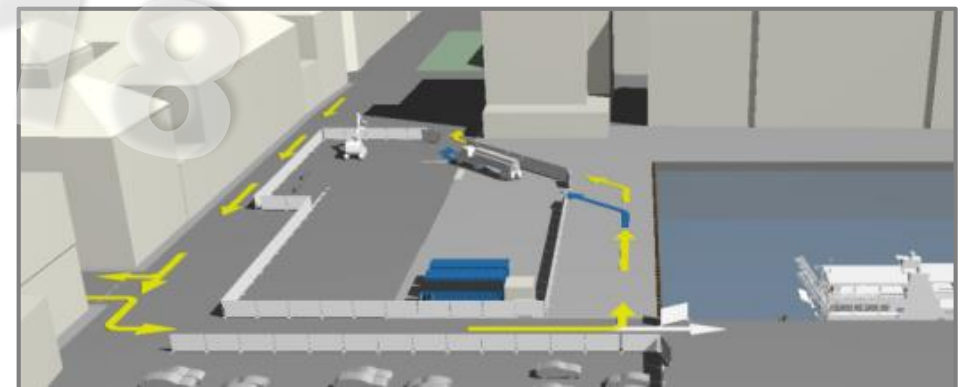
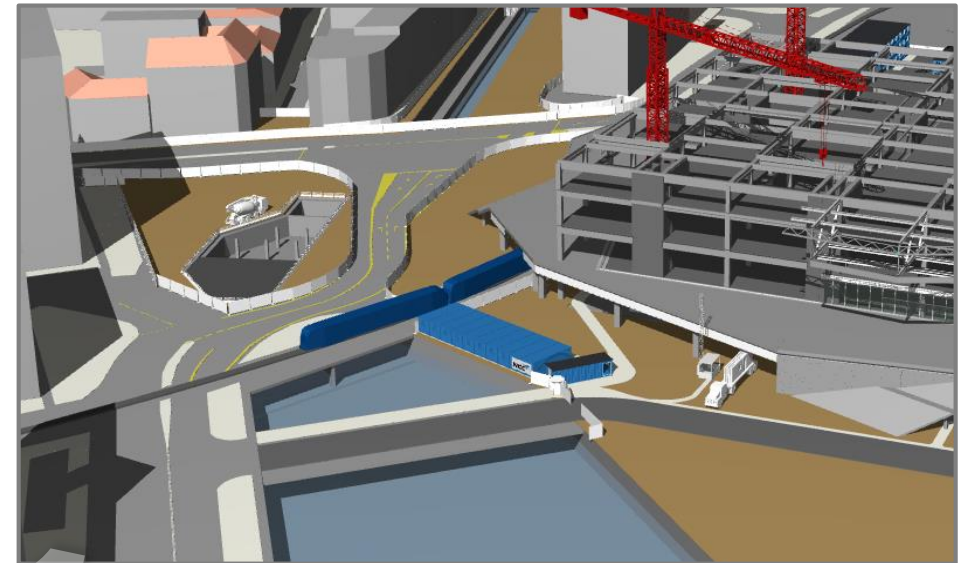
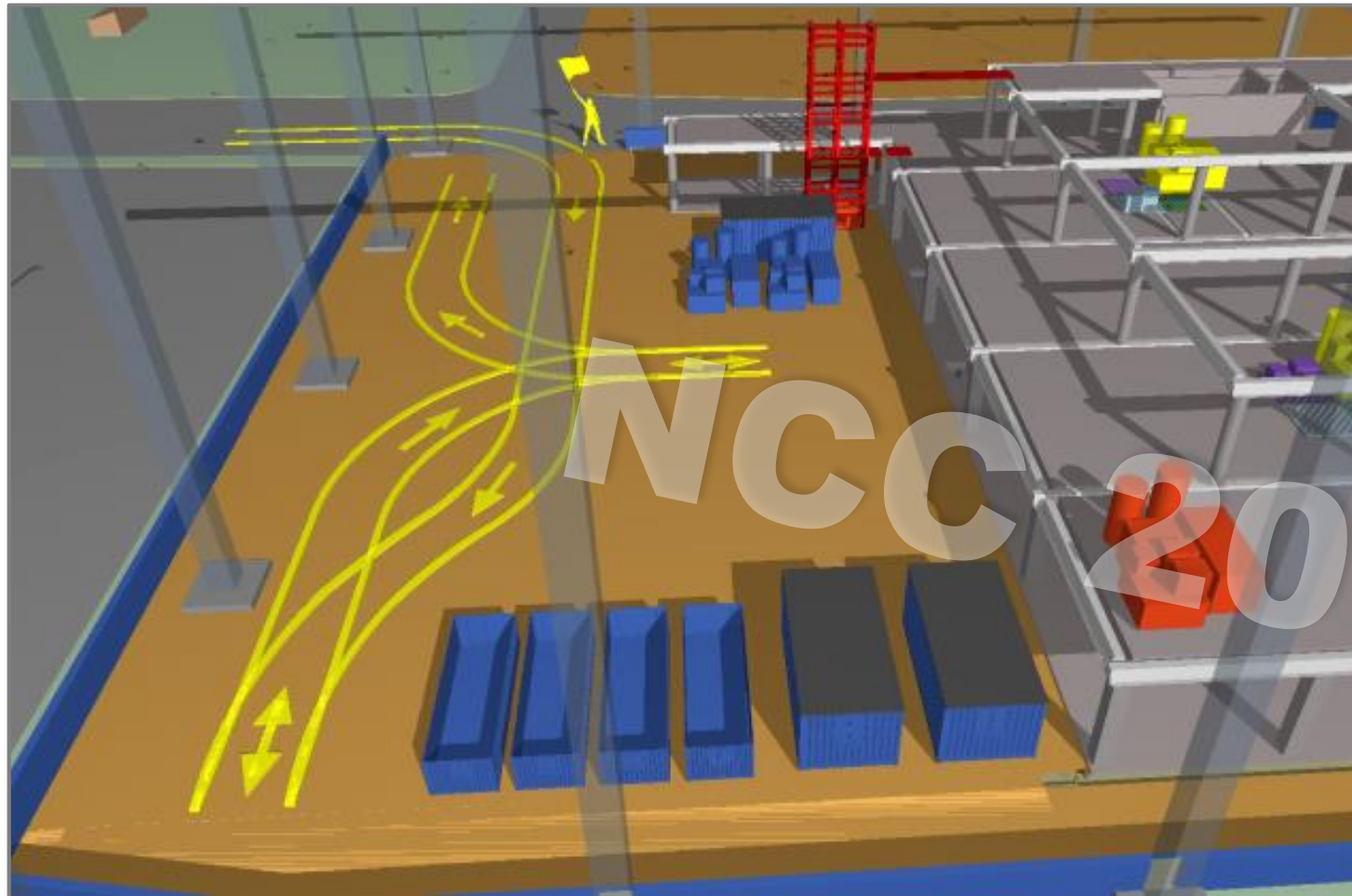
The screenshot displays a software interface for extracting quantities from PDF drawings. The main window shows a floor plan drawing with various rooms and furniture. A toolbar at the top includes icons for measurement tools, and the 'Antal' (Quantity) tool is highlighted with a red dashed box. A data table on the right lists extracted items and their quantities.

Emne	Farve	Opmåling	S
▼ Altaner (1)		6 Stk	
123 Altaner	▲	6 Stk	1
▼ Badekabine inkl. skakt (1)		7.769 m ²	
Badekabine inkl. skakt	■	7.769 m ²	1
▼ Bord inkl. 3 stole (1)		10 Stk	
123 Bord inkl. 3 stole	✓	10 Stk	1
▼ Handicap toiletter (1)		13 Stk	
123 Handicap toiletter	●	13 Stk	1
▼ Legend (1)		1 Stk	

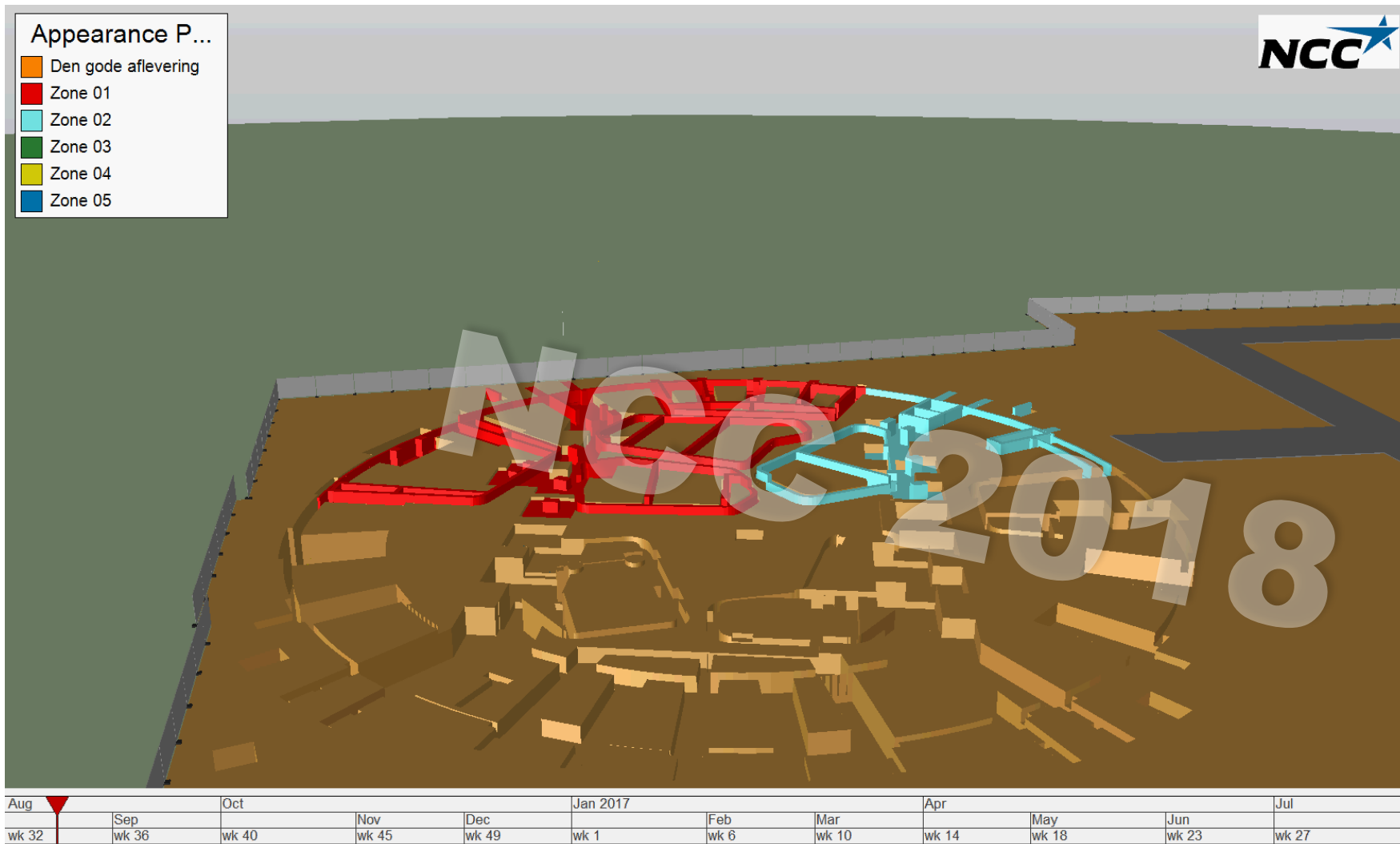
Sikkerhed

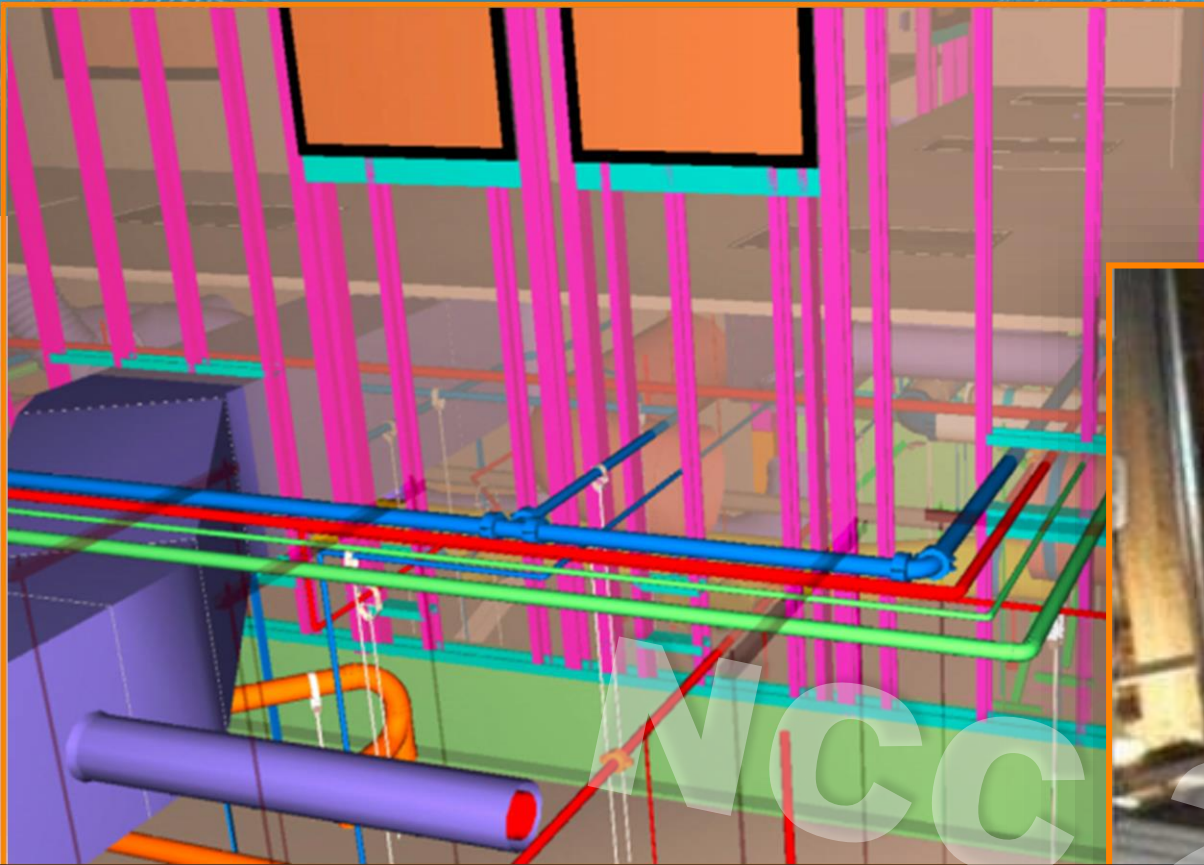


Logistik og Trafik



Produktionssimulering





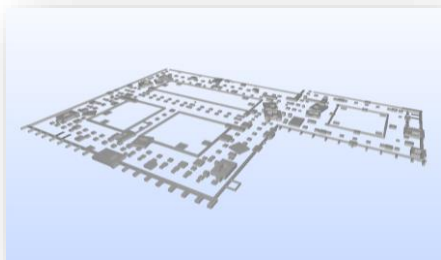
Vi optimerer ved at bygge FØR vi bygger.

The background of the slide is a blue-tinted wireframe rendering of a complex building structure, showing a dense network of lines representing the steel framework of a multi-story building. The perspective is from a low angle, looking up at the structure.

VDC i produktionen

NCC 2018

VDC i produktionen - eksempler



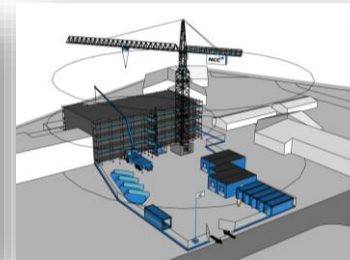
Maskinstyring



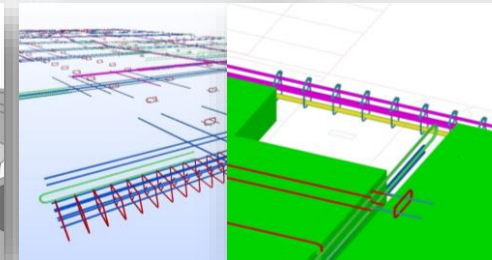
Digital opmåling



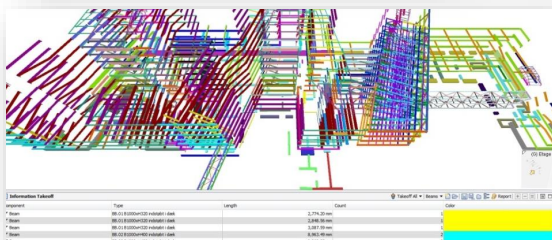
3D print af koncepter og løsninger



Byggepladsindretning



Produktionsmodeller



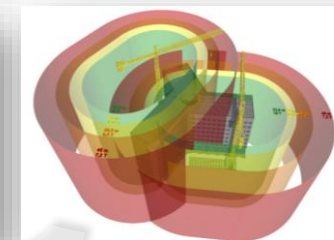
1:1 detaljering som produktionsmodeller



VR



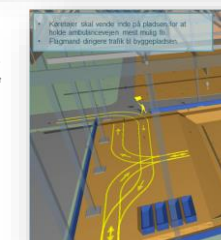
Planlægning og analyser



Krandisponeringer



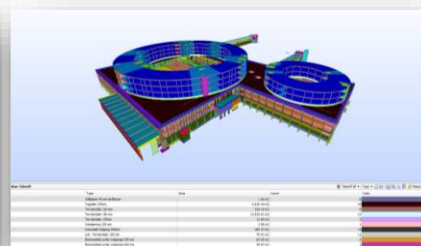
Droner



Logistik



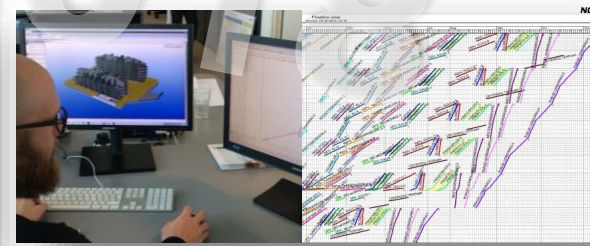
4D og 5D simulering



Granskning og verificering



Dalux, registrering



Lokationsbaseret planlægning

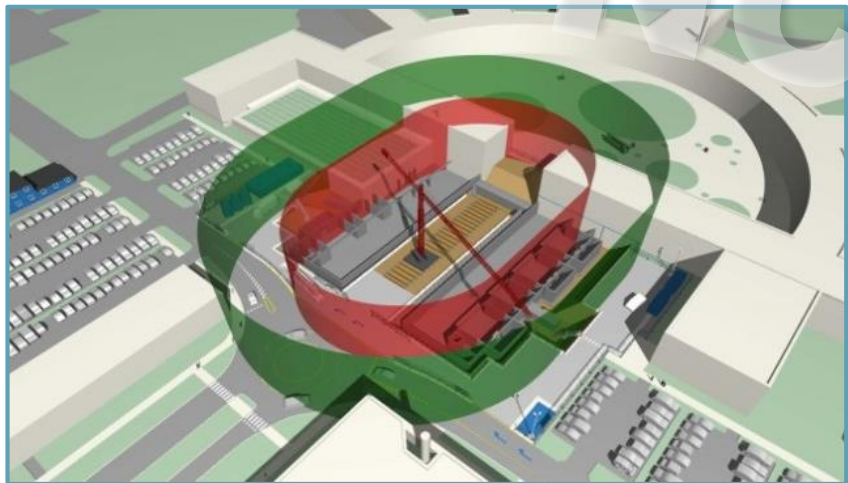
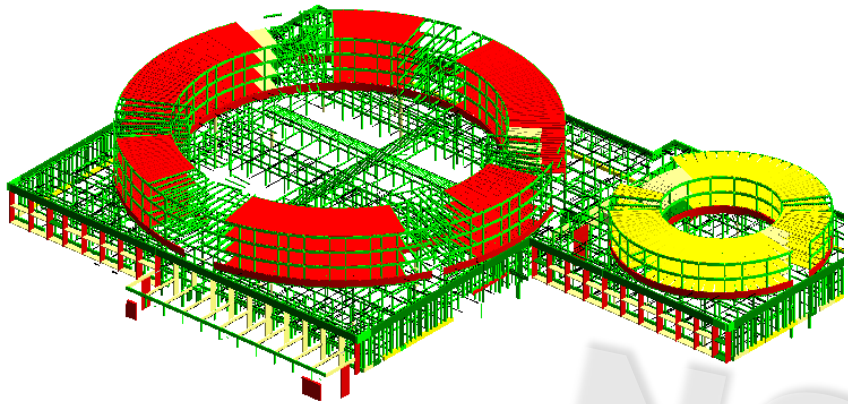


Fremdrift og monitorering

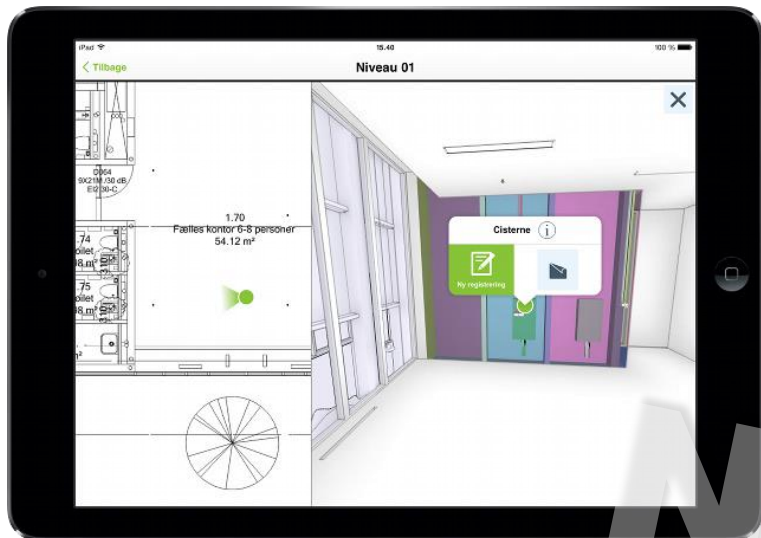
Brug af 3D modeller på pladsen



Krandisponering



Digital mangelregistrering



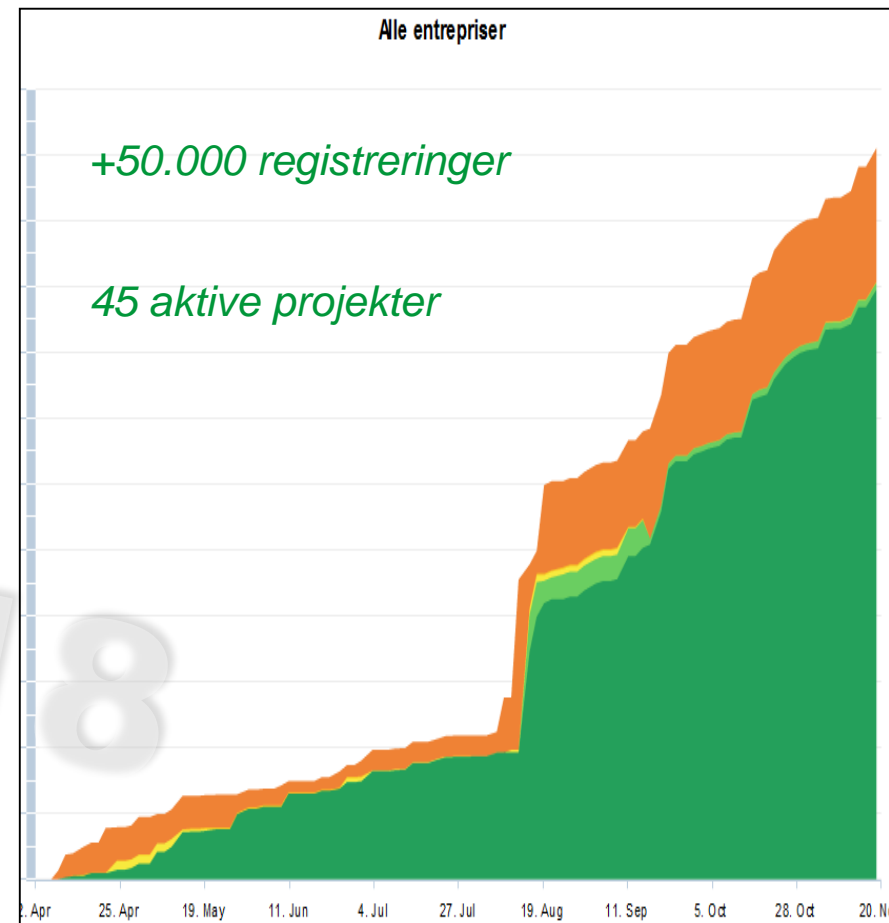
Notanr.: **NCC TF39** NCC Teknisk forespørgsel **NCC**

Projekt:	29330150-KRØYERS23	Entreprise:	KON-rådgiver
Bygning:	KRØYER23 - 29330150	Tilsejnsområde:	-
Etage:	Stue Plan	Oprettet:	12. dec 2014, 14:58
Tegning:	S03-Stue Plan	Deadline:	9. jan 2015
Bygningsdel:	Skillevejstg	Oprettet af:	NCC Construction
		Ansvarlig:	(Godkendt, lukket)

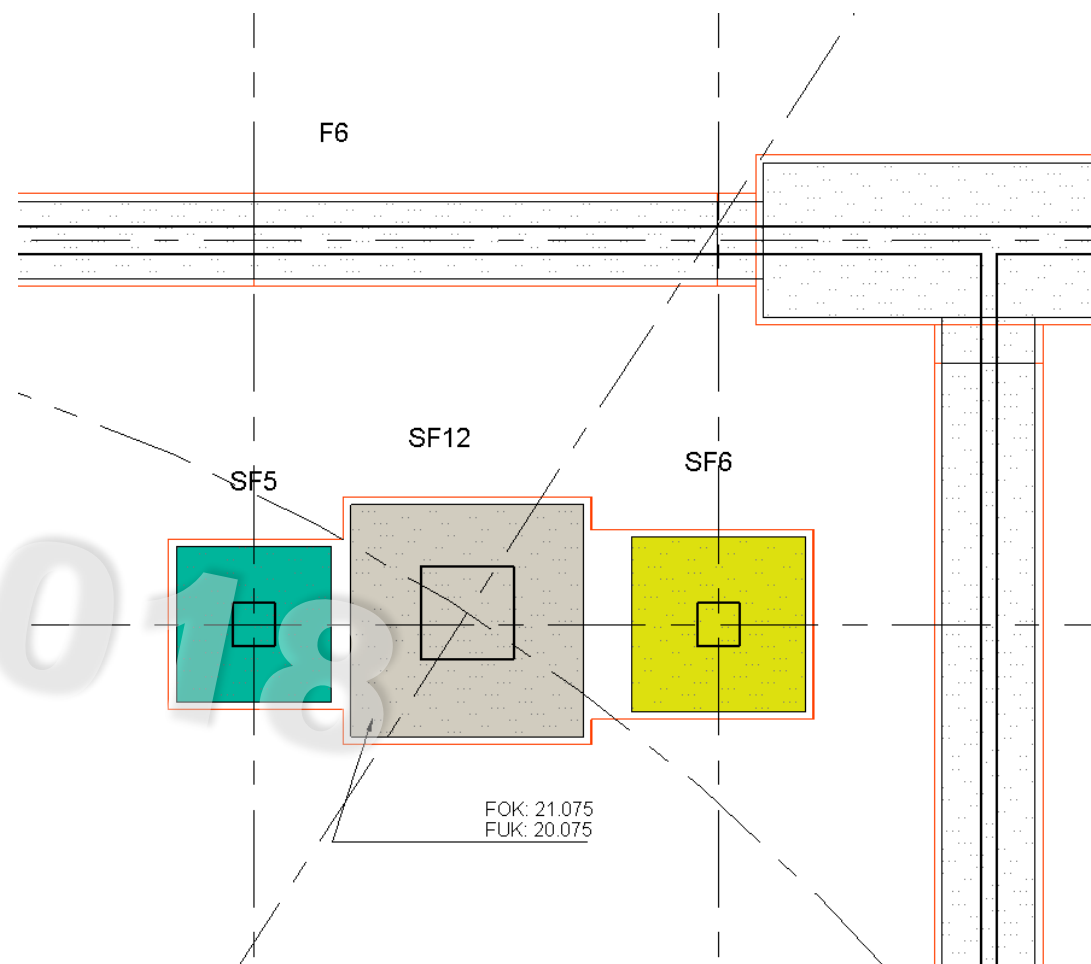
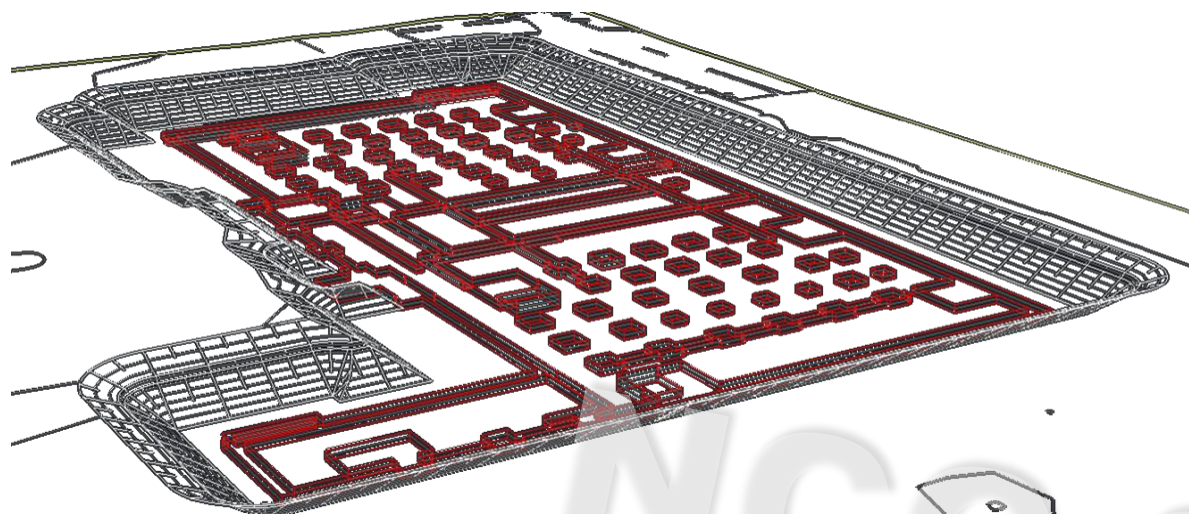
12. dec 2014, 14:58
Tidstid af Cowi A/S

Oprettet af:	Klaus Iversen, NCC Construction
Tildelt:	Kasper Kristensen, Cowi A/S
Emne:	Ændring af den placering II i del 7.9.0.4
Deadline:	9. jan 2015
Beskrivelse:	<ol style="list-style-type: none"> 1. Derhul ønskes flyttet 470mm jr. SK-AX-01 2. Løseblokke opmures og pudses. 3. Efterforsker tilles ud efterfølgende i anden Entreprise.

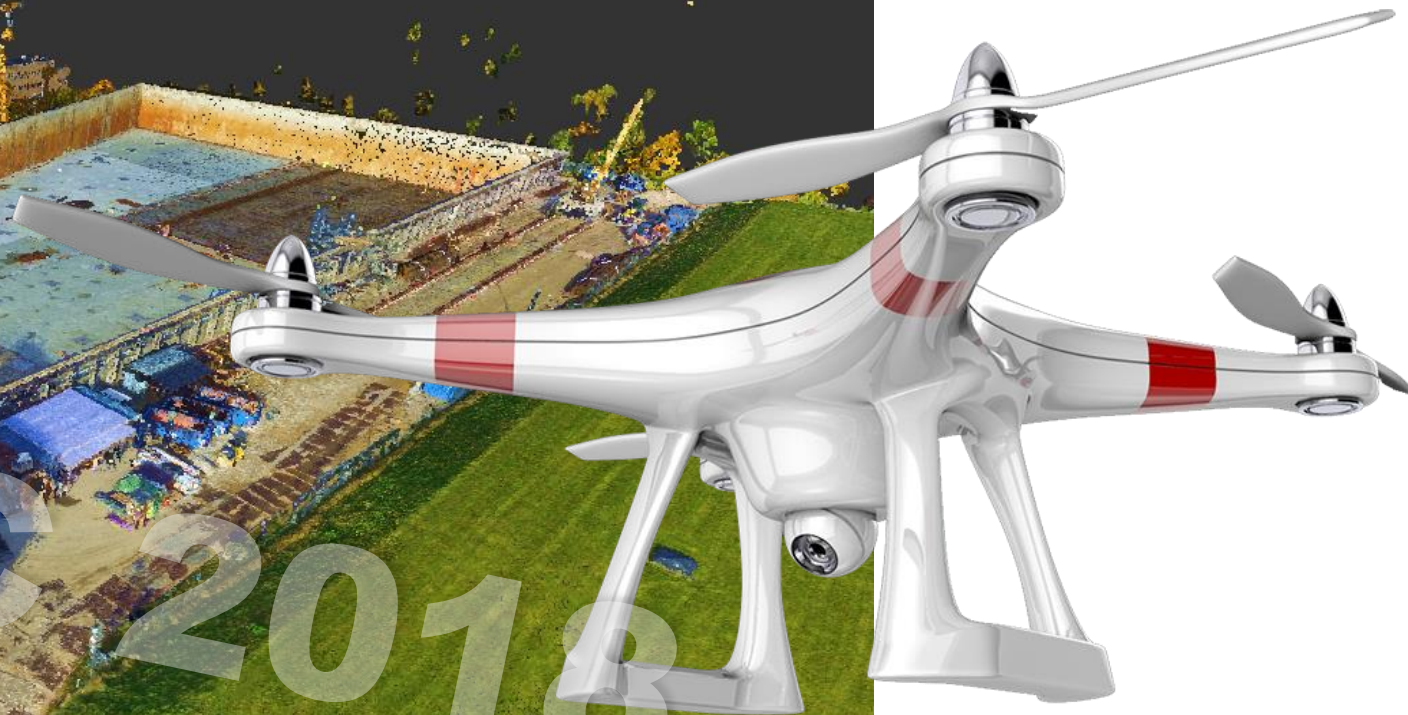
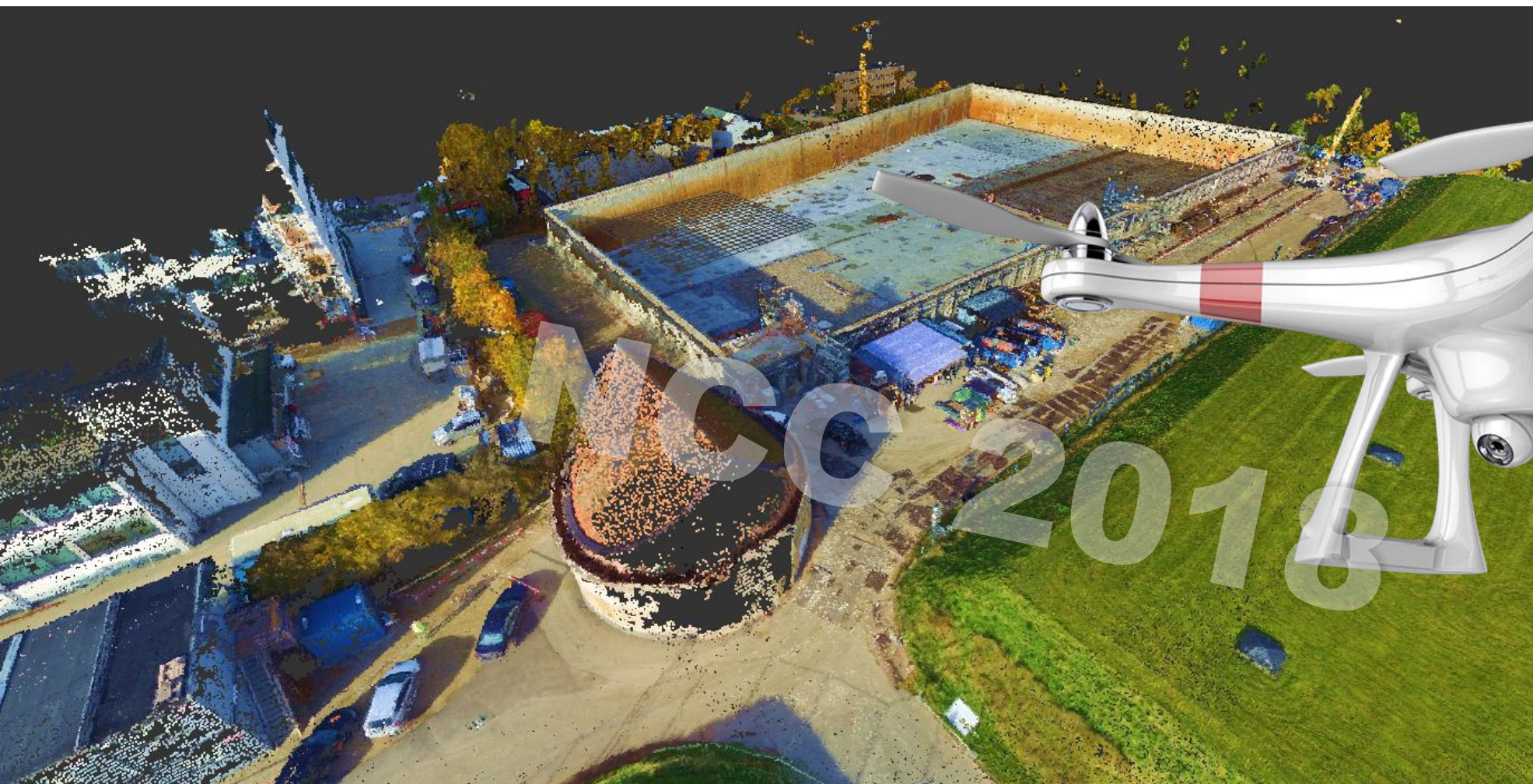
Dalux Field Side 1 af 3 Udskrevet 27. nov 2015, 07:26



Maskinstyring



Droner



Droner - dokumentation



Mål og udfordringer

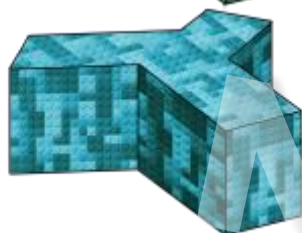
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Processen vi er på vej mod...

ARCHITECTURAL
MODEL



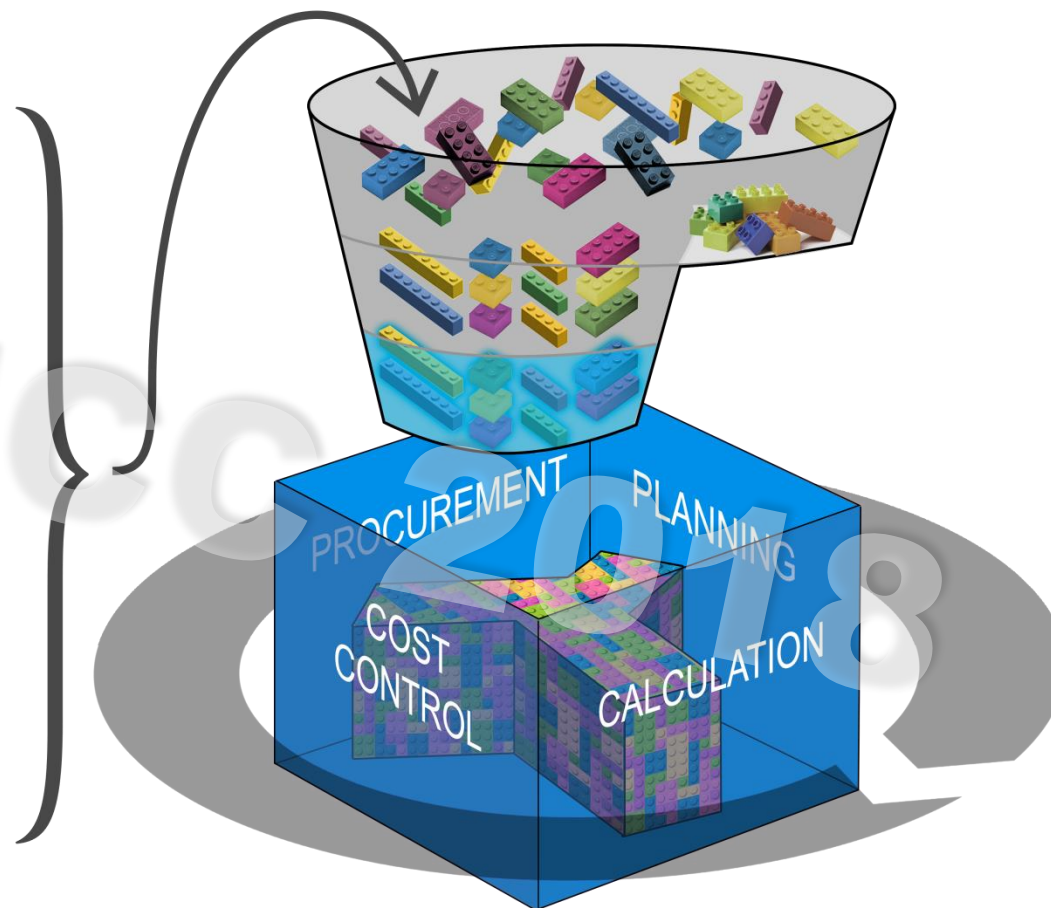
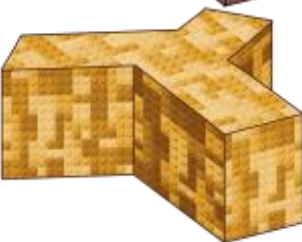
STRUCTURAL
MODEL



TECHNICAL
MODEL



SUPLIER
MODEL



Udvælge

Organisere

Berige

Udnytte
mulighederne

Udfordringer



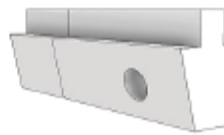

“...almost every building that we build is still a one off design, constructed piece by piece on site. The inefficiencies of all phases of building – from procurement through to design and construction are outstanding. Even when a building is not designed by an architect, if it’s larger than a house, it’s almost certainly a one off design.”

Udfordringer

“...almost every building that we build is still a one off design, constructed piece by piece on site. The inefficiencies of all phases of building – from procurement through to design and construction are outstanding. Even when a building is not designed by an architect, if it’s larger than a house, it’s almost certainly a one off design.”

Ikke problemet...

Udfordringer

DiKon							
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	Inf. 1	Inf. 2	Information level 3	Information level 4	Information level 5	Information level 6	Inf. 7
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