

BEDRE BY- OG BOLIGOMRÅDER MED AUTODESK FORMA

KAN AI UDVIKLE BYER?

EVEN BRÆNNE OLSTAD

Arkitekt og løsningskonsulent



Hvem?



Even Olstad

Arkitekt + Løsningskonsulent

Arkitekt fra KADK i 2013

Konkurrence-, design- og teamledelse ved Arkitema og
Nordic- Office of Architecture

Autodesk Forma 2021 -

Agenda



Udfordringen

Forma nu

Forma next; AI, API og samarbejde

Spørgsmål

Safe harbor statement

The presentations during this event may contain forward-looking statements about our outlook, future results and related assumptions, total addressable markets, acquisitions, products and product capabilities, and strategies. These statements reflect our best judgment based on currently known factors. Actual events or results could differ materially. Please refer to our SEC filings, including our most recent Form 10-K and Form 10-Q filings available at www.sec.gov, for important risks and other factors that may cause our actual results to differ from those in our forward-looking statements.

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DIGITAL BY- OG PROJEKTUDVIKLING

Hvorfor er rigtig byplanlægning vigtigt?

+ 2.5 milliarder



Mennesker på
kloden inden 2050

90% global
vækst i urbane
områder



= 1 ny Paris hver
uge

CO₂

40% af al
karbonforurening kommer
fra byg og anlæg

Hvorfor er rigtig byplanlægning vigtigt?

+ 2.5 milliarder

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90% global
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= 1 ny Paris hver
uge

CO₂

40% af al
karbonforurening kommer
fra byg og anlæg

DK

By vs. land

Branchens store udfordringer



Lav effektivitet



Gamle værktøj



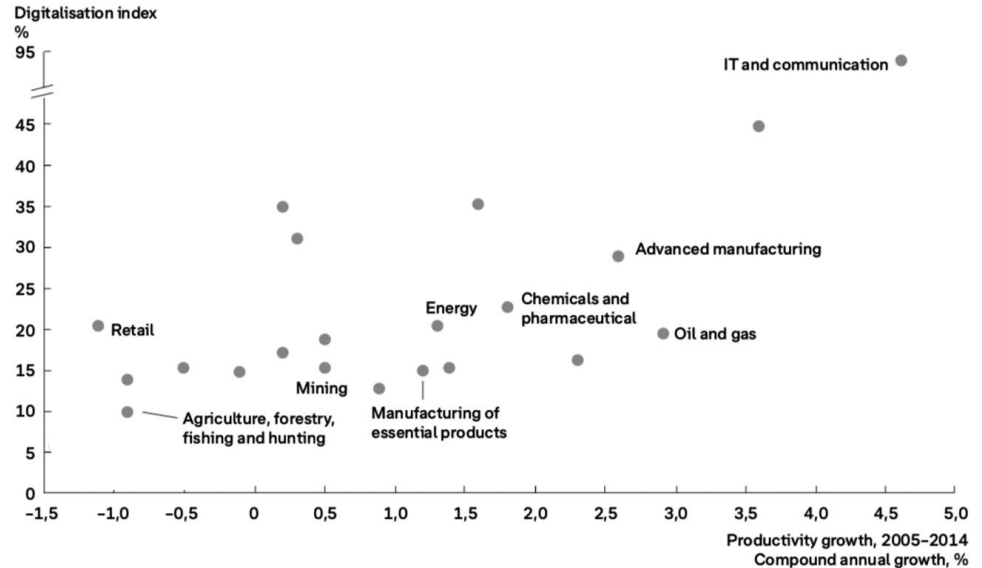
Øgende kompleksitet



Mere bæredygtighed

Udfordring:

Ejendomsbranchen har lav digitalisering og lav produktivitet



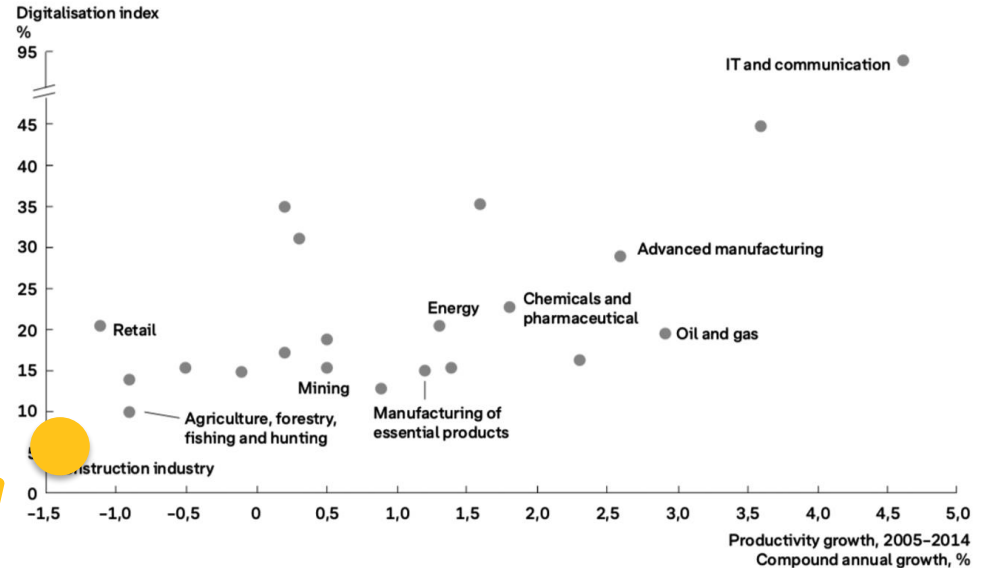
Productivity growth and rate of digitalisation, 2005–2014.

Source: McKinsey Global Institute, Reinventing construction: A route to higher productivity, February 2017.

Udfordring:

Ejendomsbranchen har lav digitalisering og lav produktivitet

You are here: 



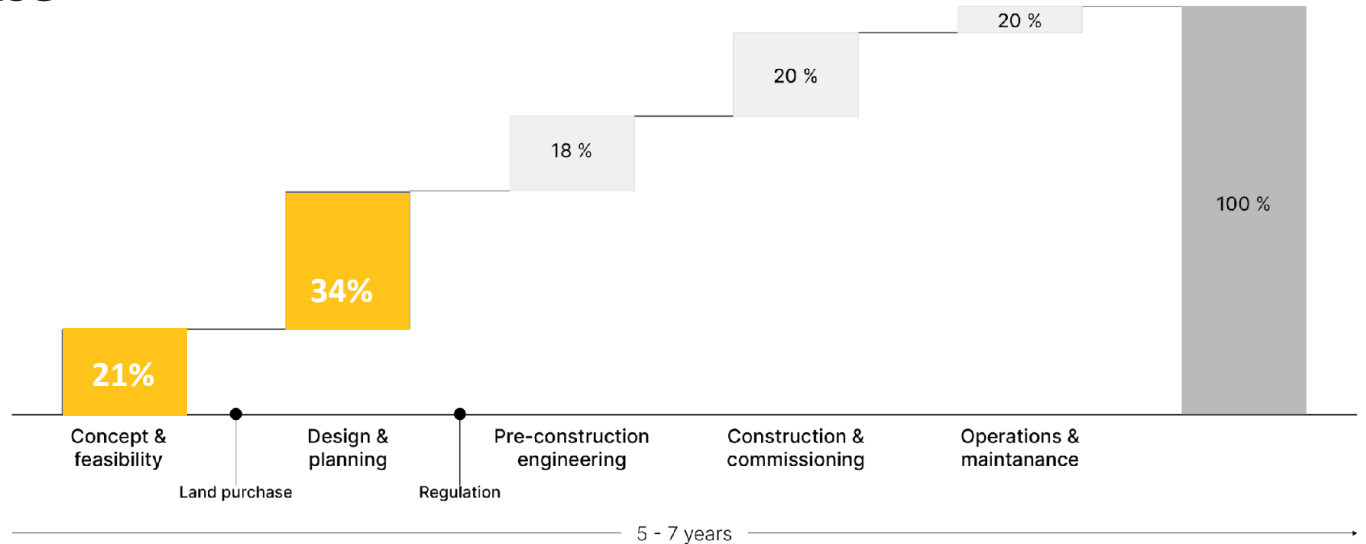
Productivity growth and rate of digitalisation, 2005-2014.

Source: McKinsey Global Institute, Reinventing construction: A route to higher productivity, February 2017.

Udfordring:

50% af værdiskabningen sker i tidlig fase

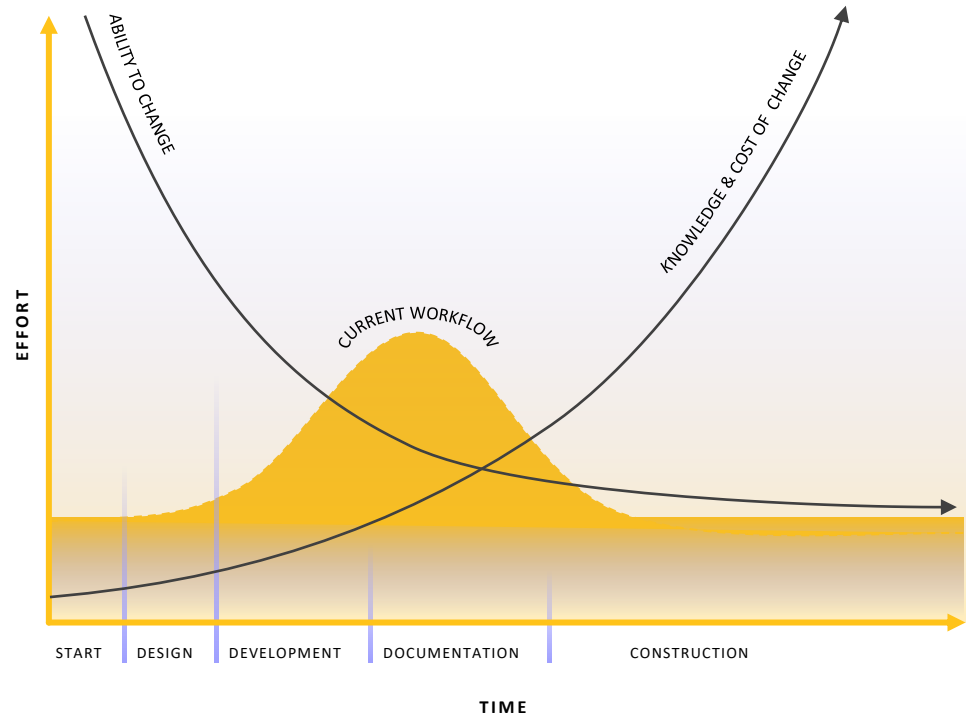
... men kun 20% af tech-investering sker her.



Source: Skanska Annual Report 2018

Udfordring:

Vi tager de største beslutninger når vi har mindst viden



Udfordring:

Høj kompleksitet i tidlig fase





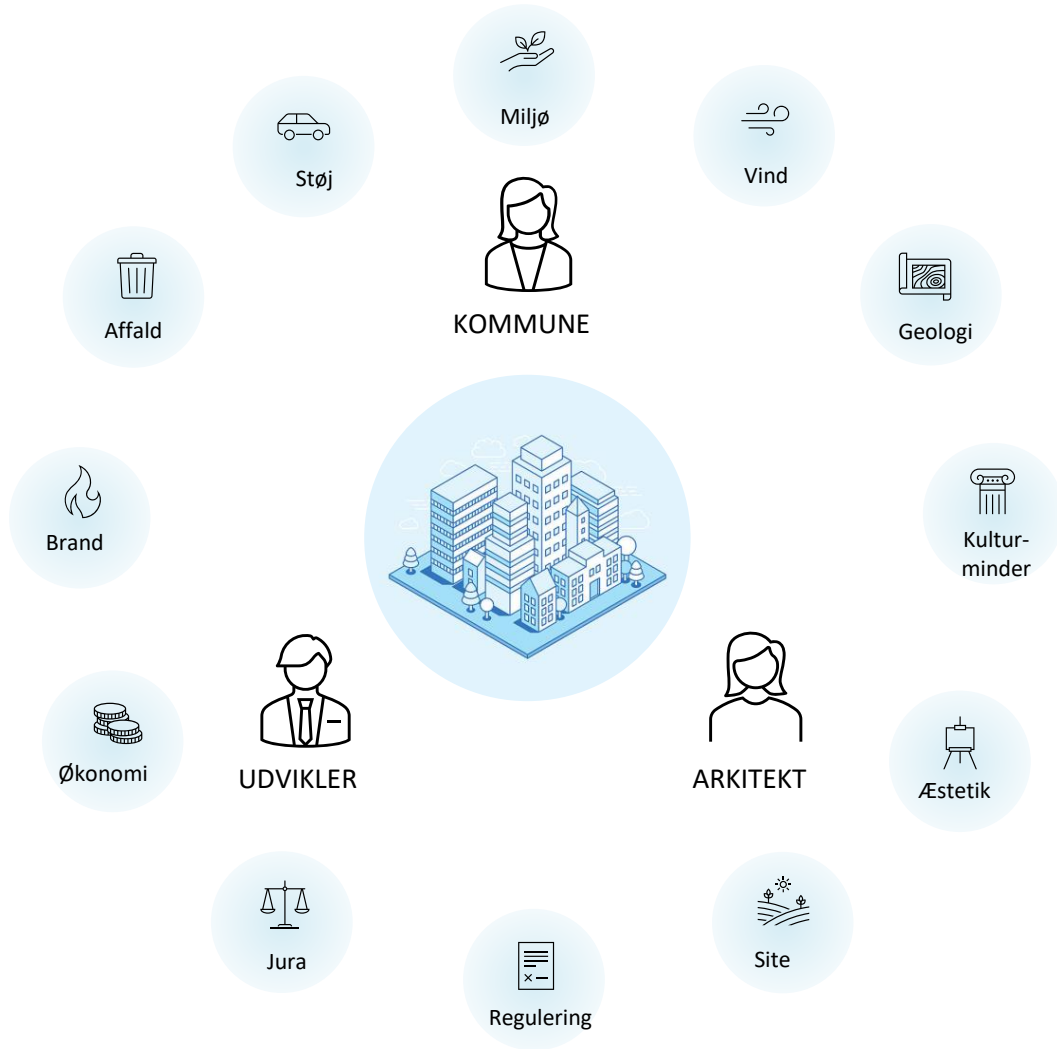
KOMMUNE



UDVIKLER



ARKITEKT



Miljø

Vind

Geologi

Kultur-minder

Æstetik

Site

Regulering

Jura

UDVIKLER

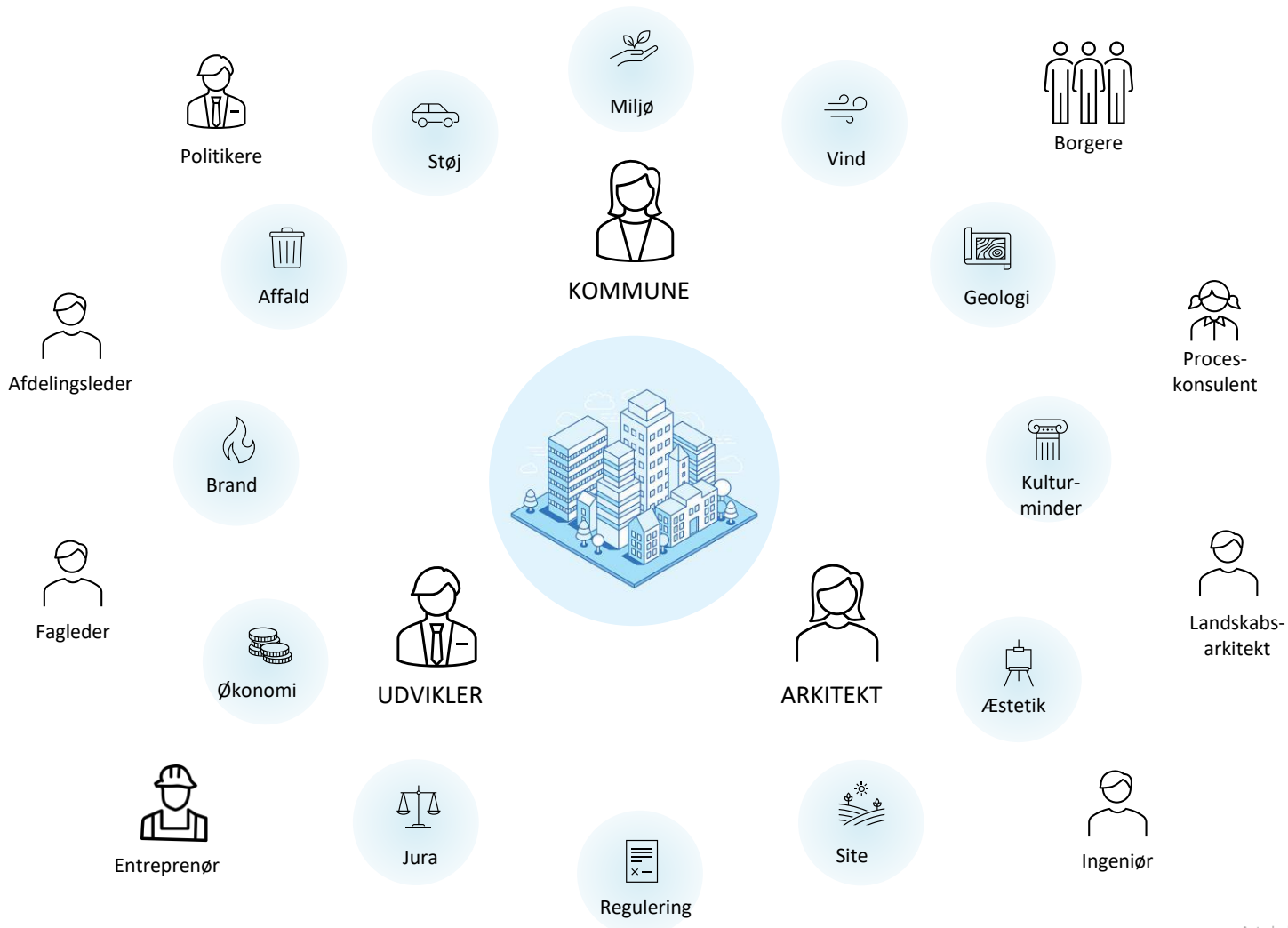
Økonomi

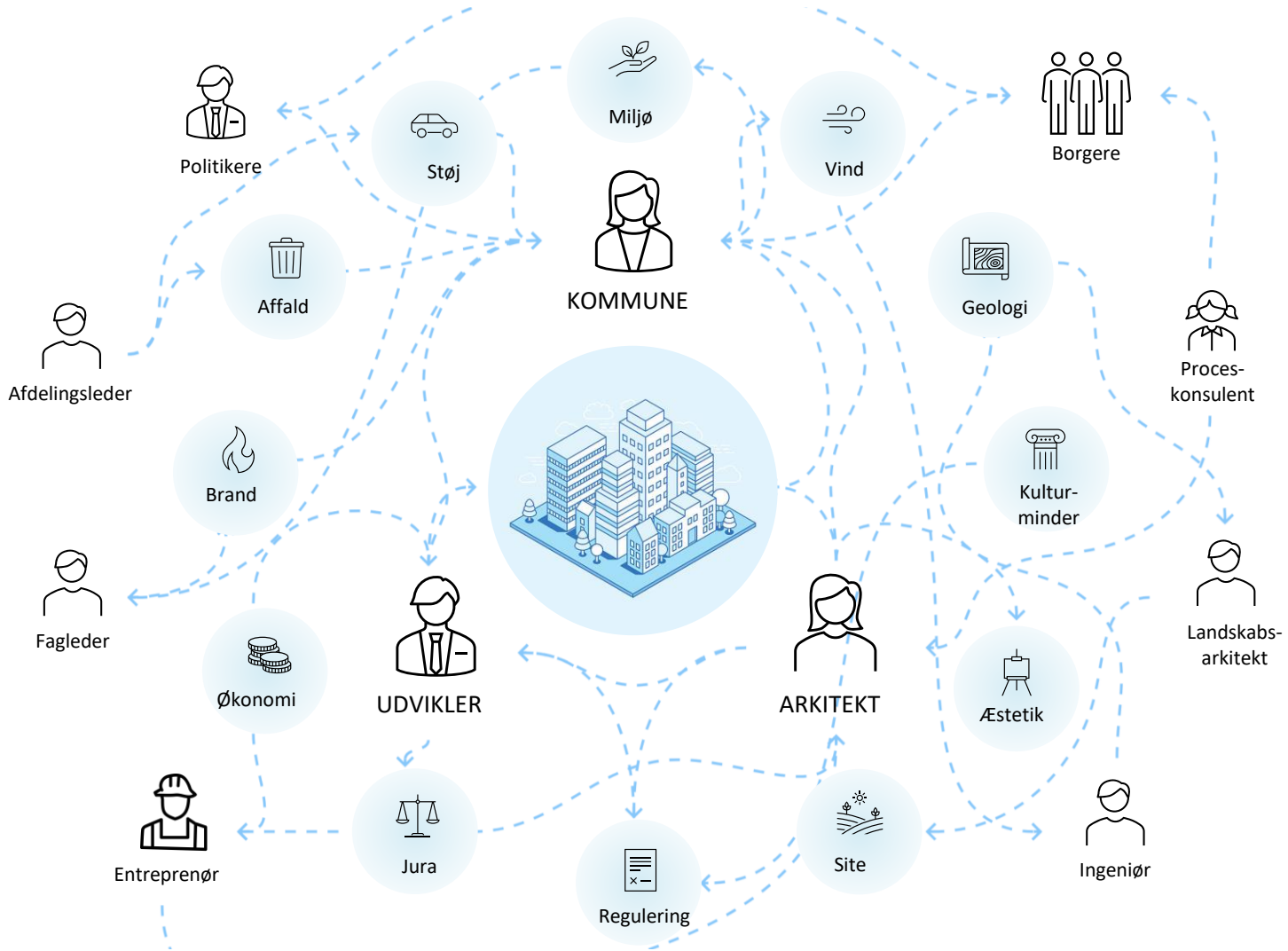
Brand

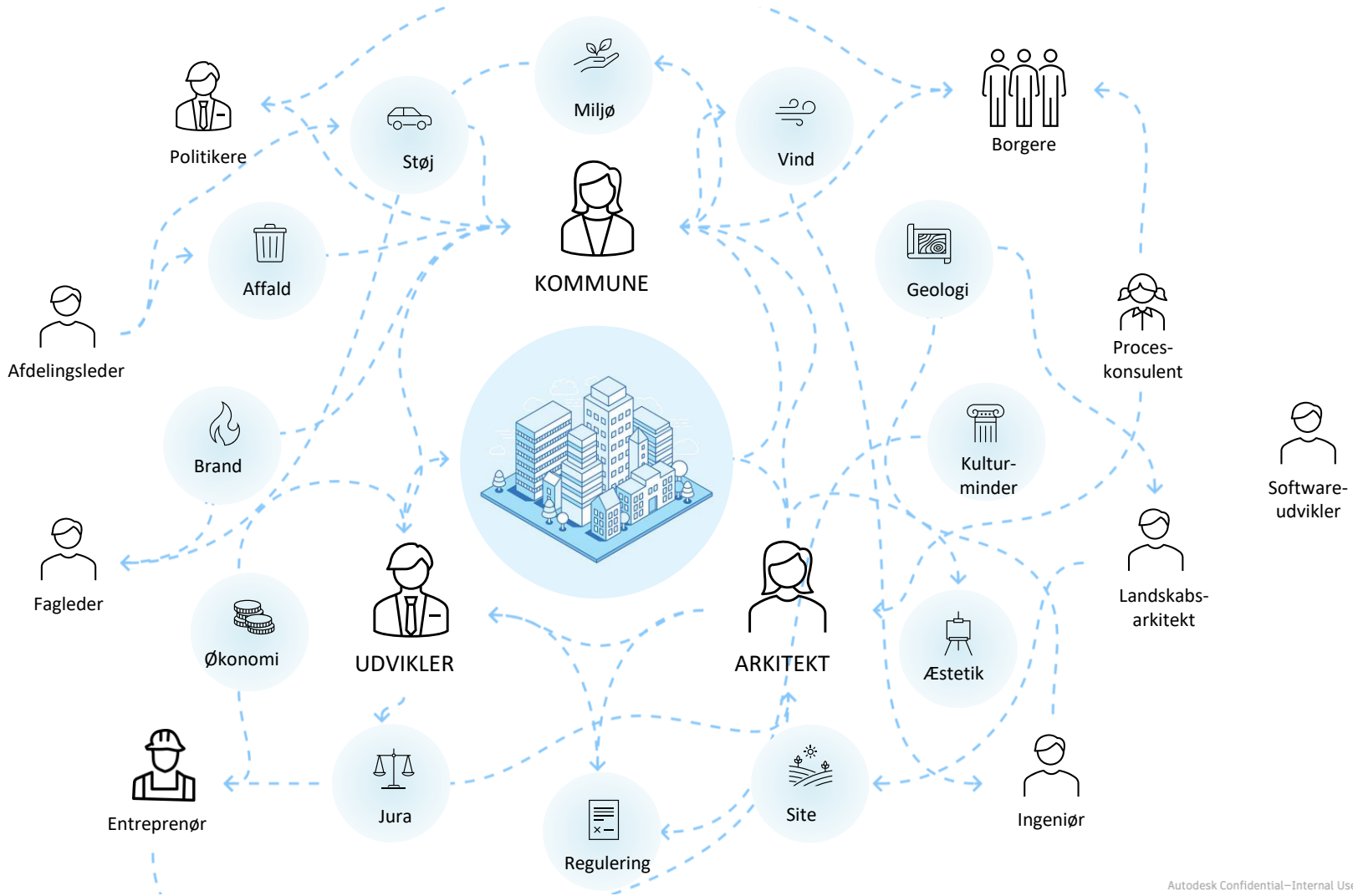
Affald

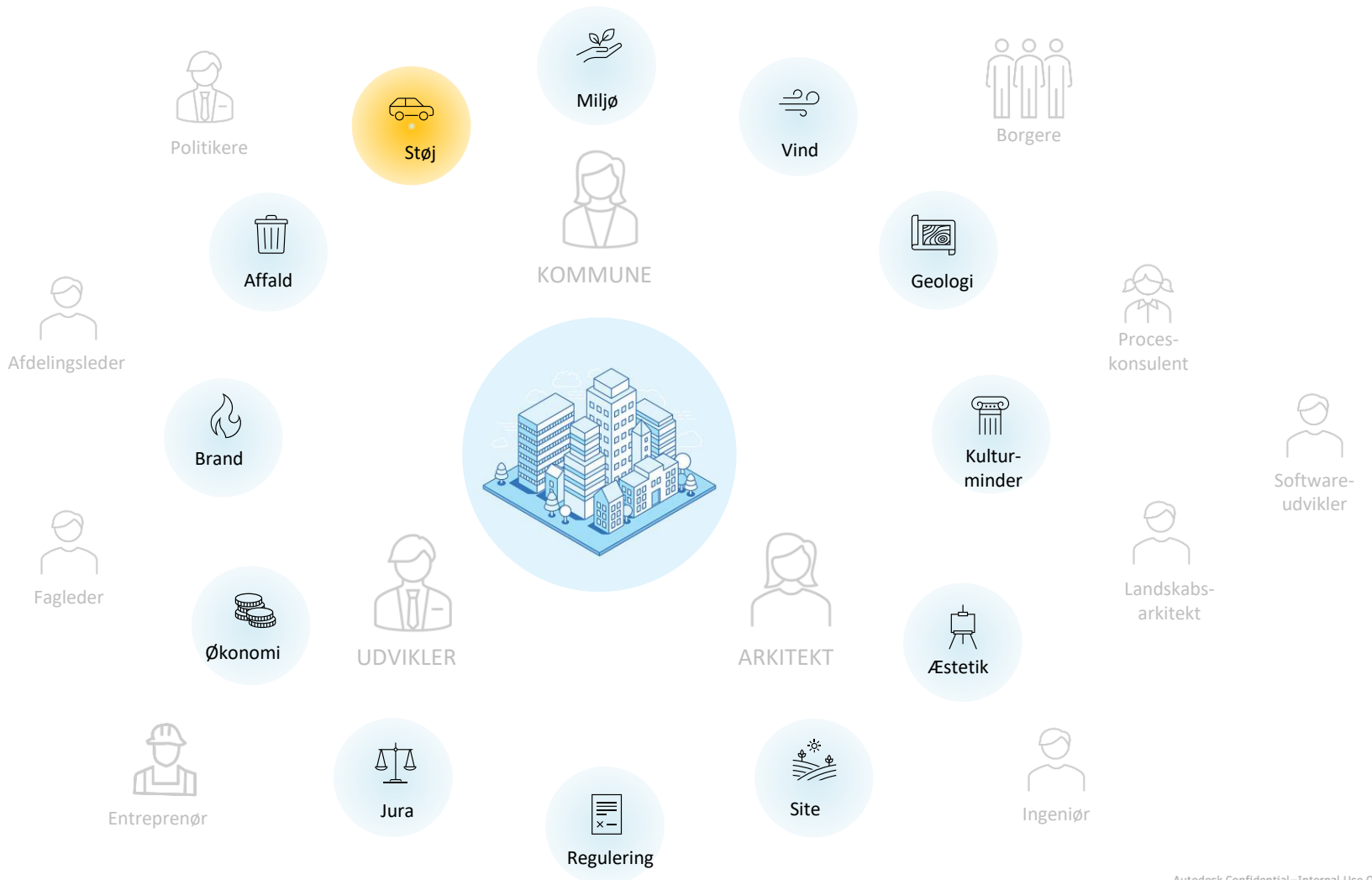
Støj

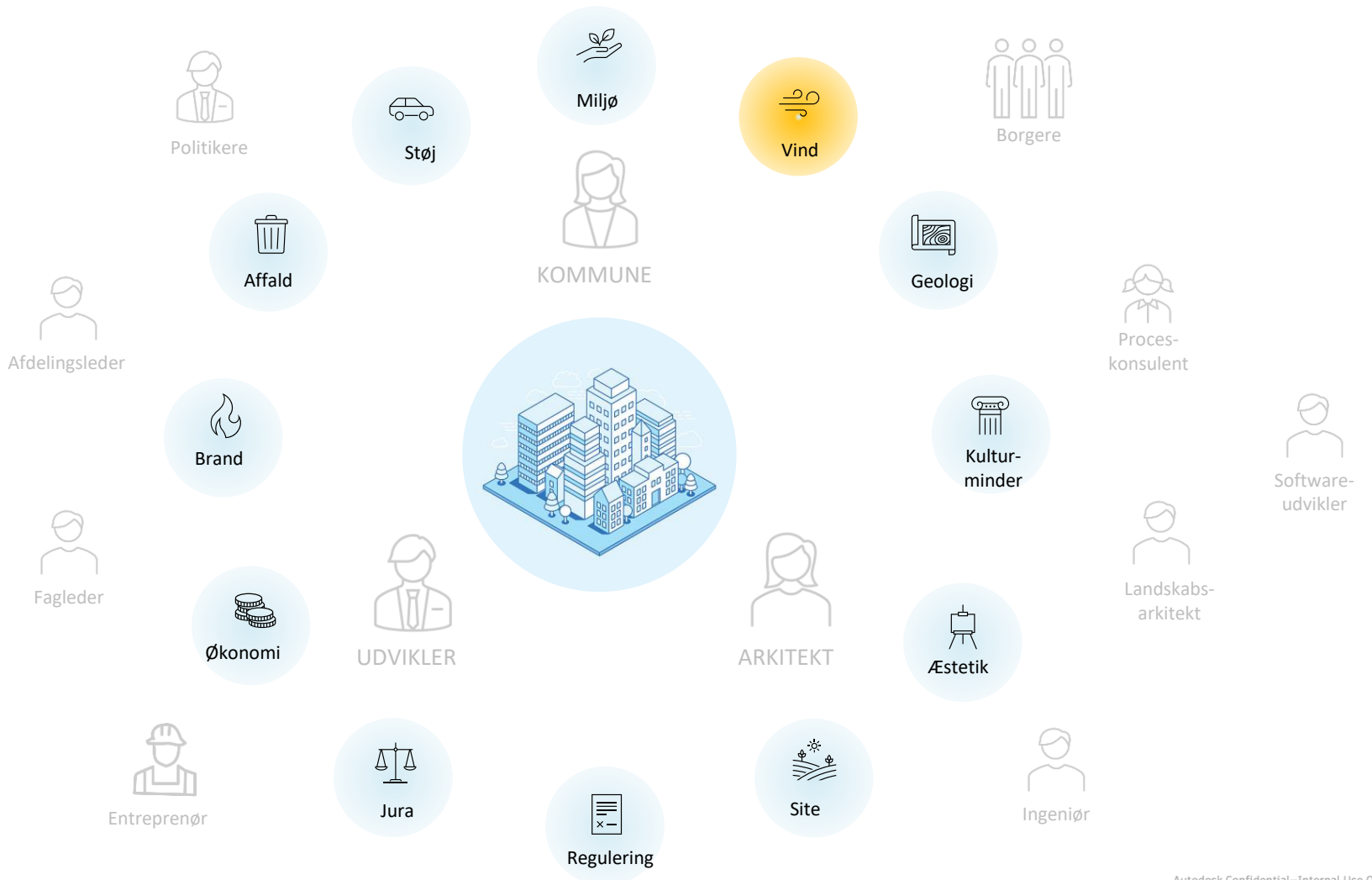
KOMMUNE

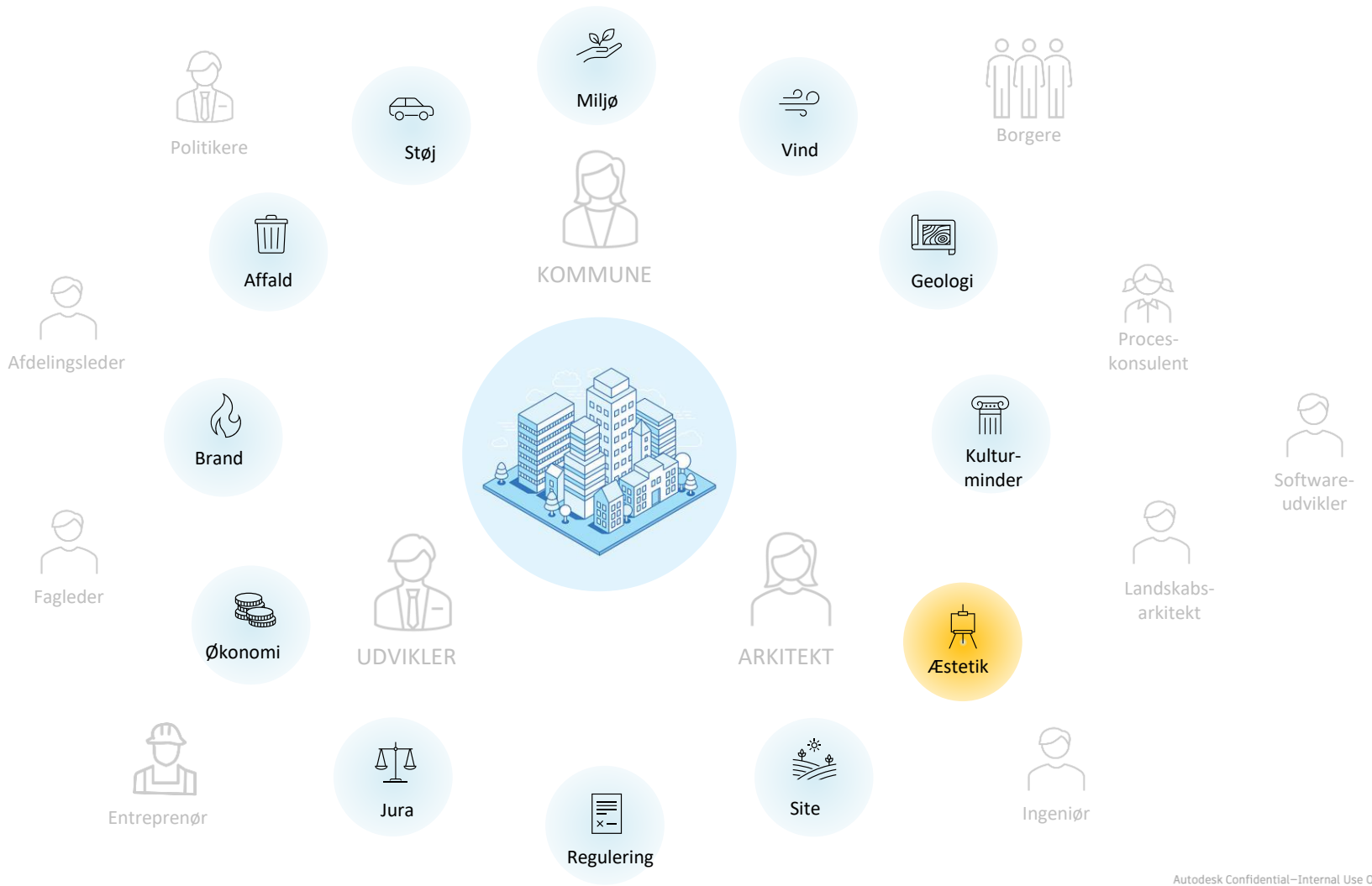


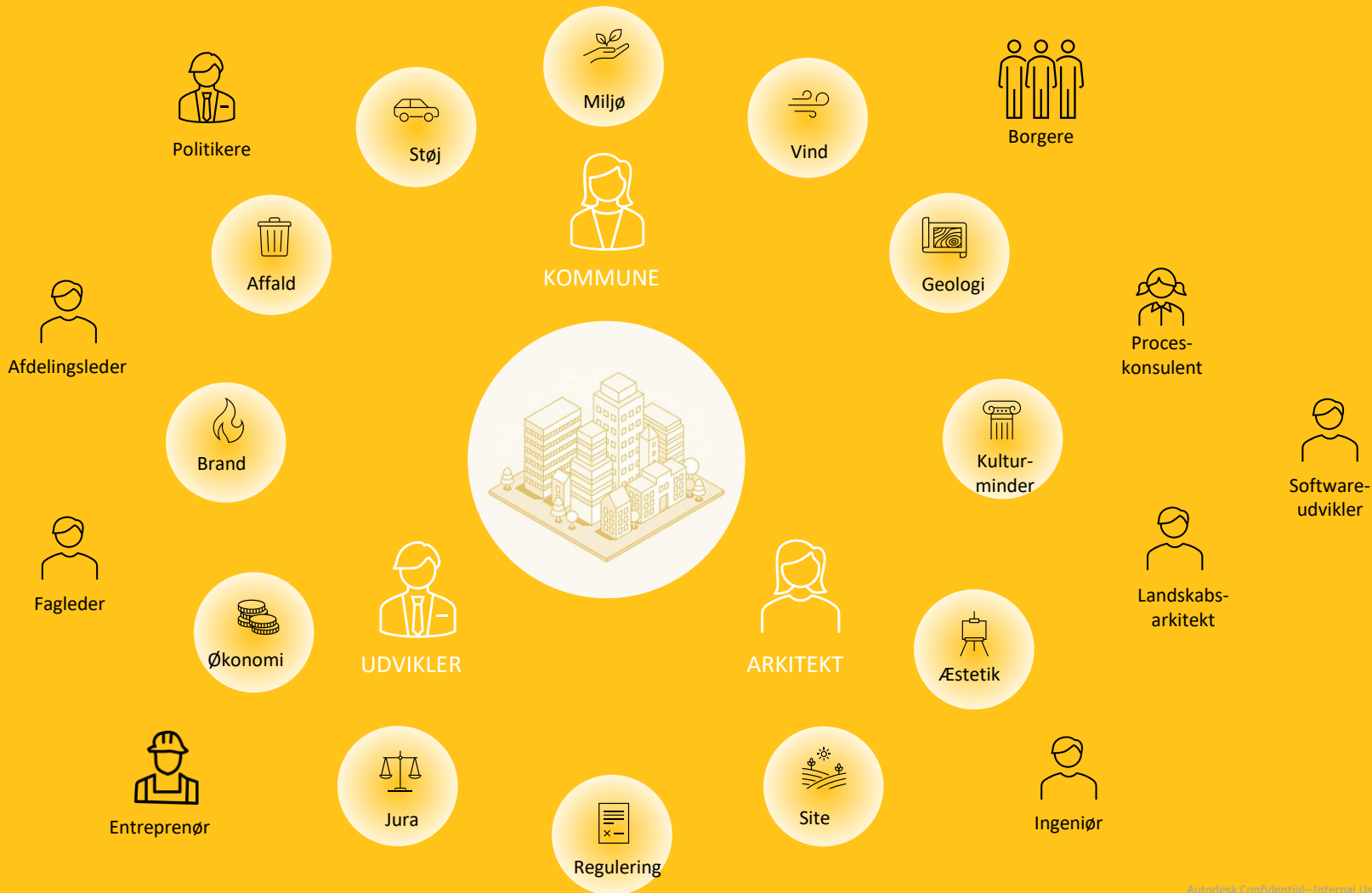














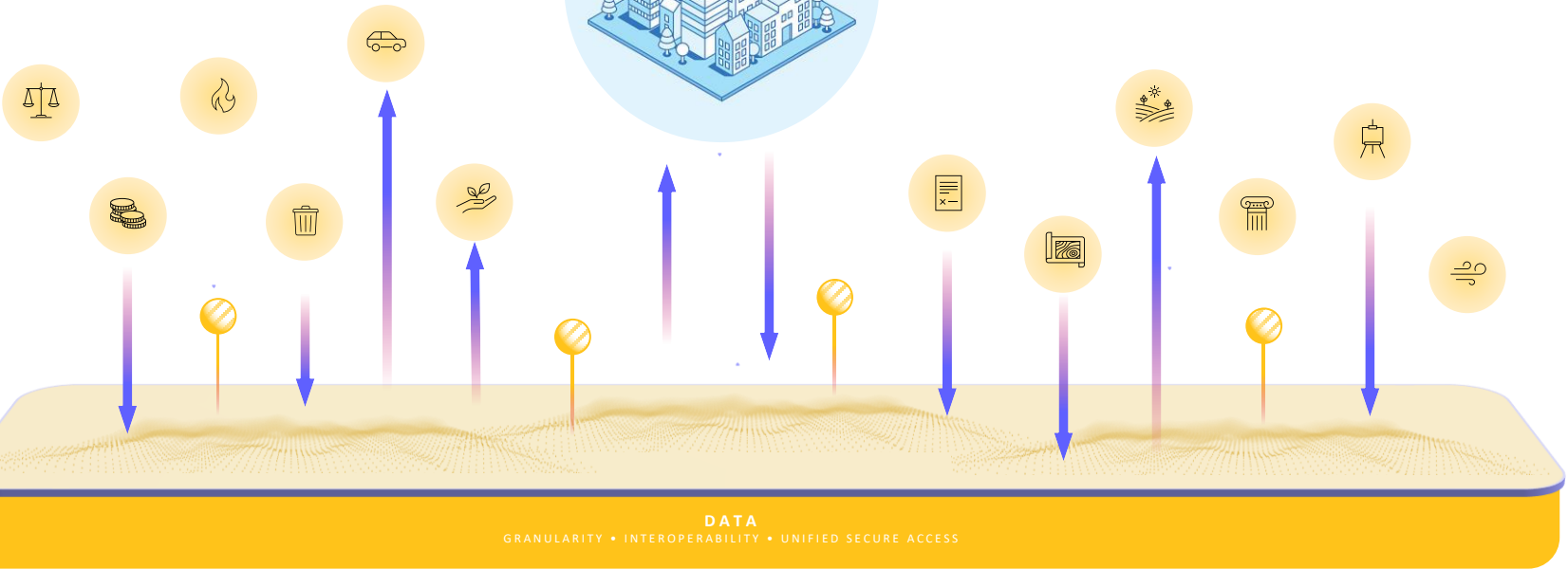
KOMMUNE



ARKITEKT



UDVIKLER



DATA

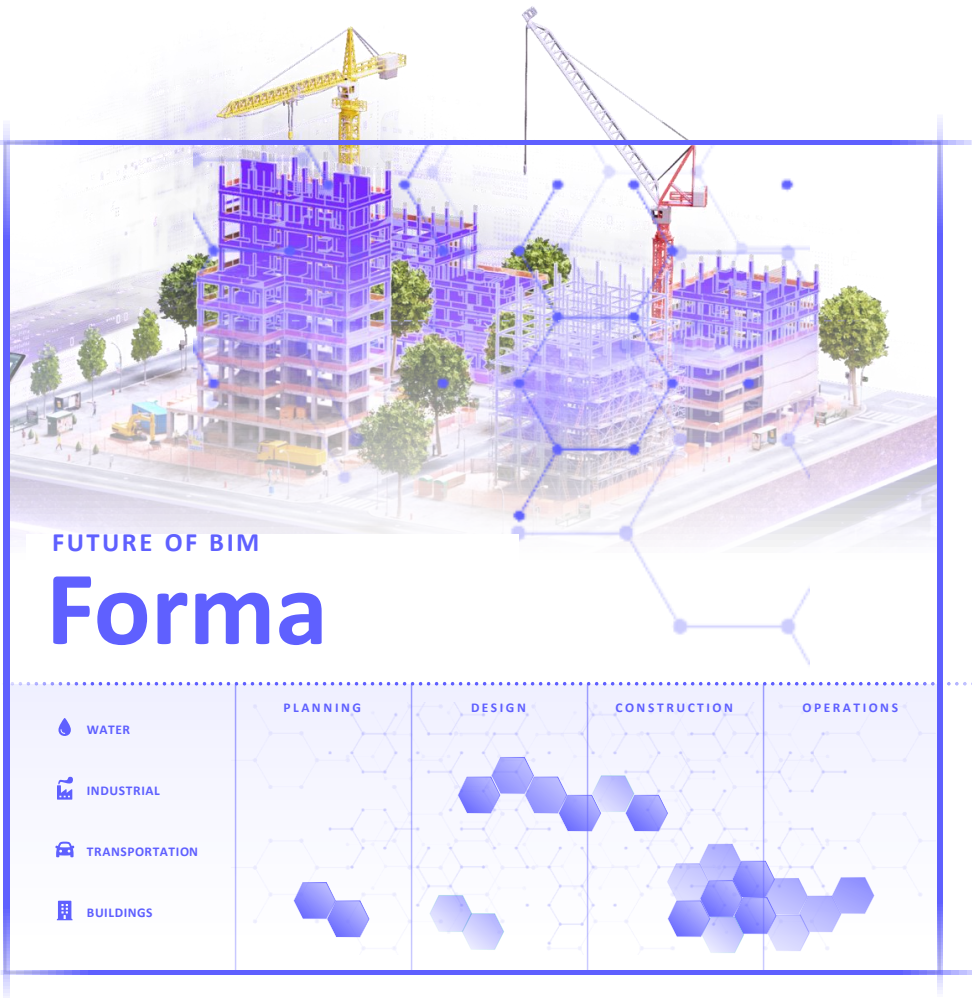
GRANULARITY • INTEROPERABILITY • UNIFIED SECURE ACCESS

Hvad er Formas langsigtede vision?

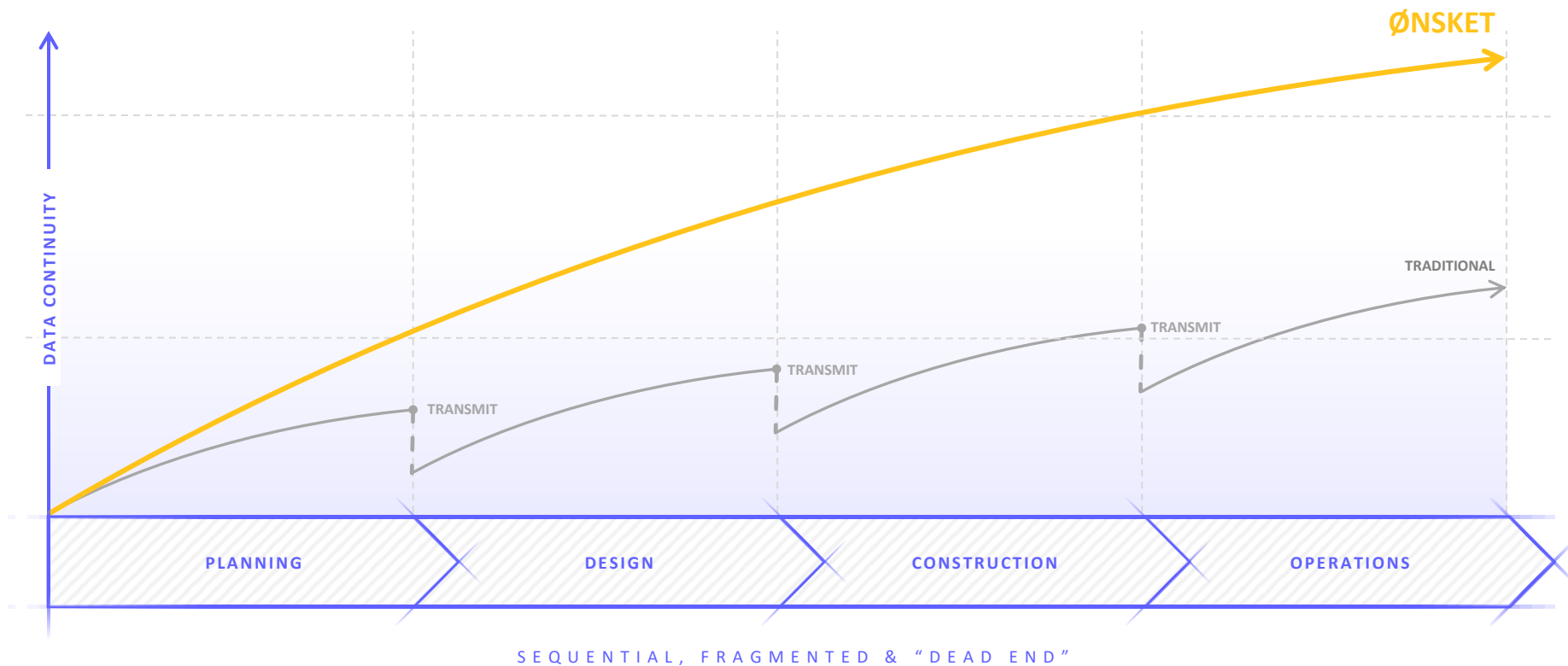
“Industry cloud” for arkitektur, ingeniørarbejde, byggeri og drift

Forener BIM arbejdsgange på tværs af hold der arbejder med planlægning, design, byggeri og drift i byggebranchen

Granulære data der problemfrit flyder mellem projektfaser, involverede parter og aktiver (bygninger, vand, transport, industri)

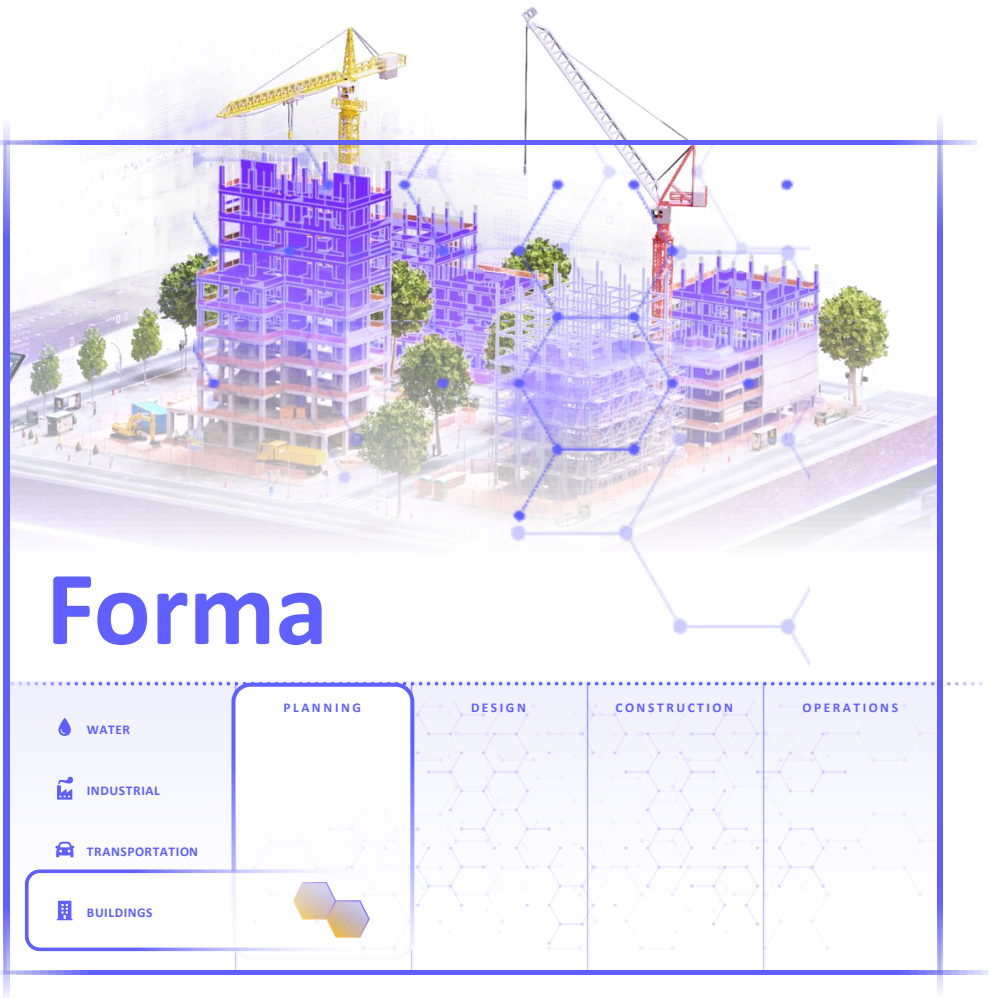


Intet tab af viden og arbejde mellem faser

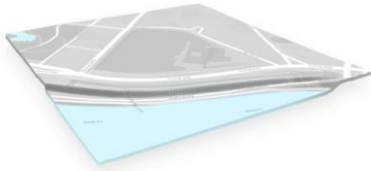


Autodesk Forma er startet på en flerårig rejse

Vi starter på begyndelsen, med planlægning og projekternes tidlige faser.

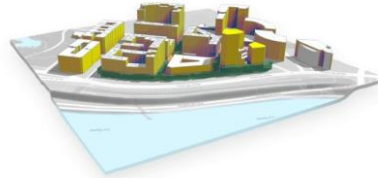


Forma leverer værdi på tre måder:



CONTEXTUAL DATA

Rapid setup of BIM model with real world contextual data



DESIGN & AUTOMATIONS

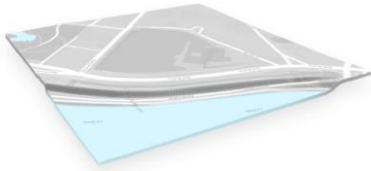
Design, explore and optimize solutions with ease of use



ANALYSES

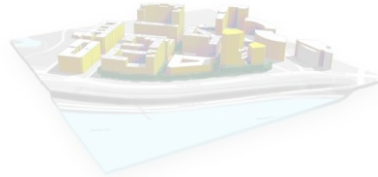
Perform real time analysis to evaluate and improve designs

Hurtig setup med kontekstdata



CONTEXTUAL DATA

Rapid setup of BIM model with real world contextual data



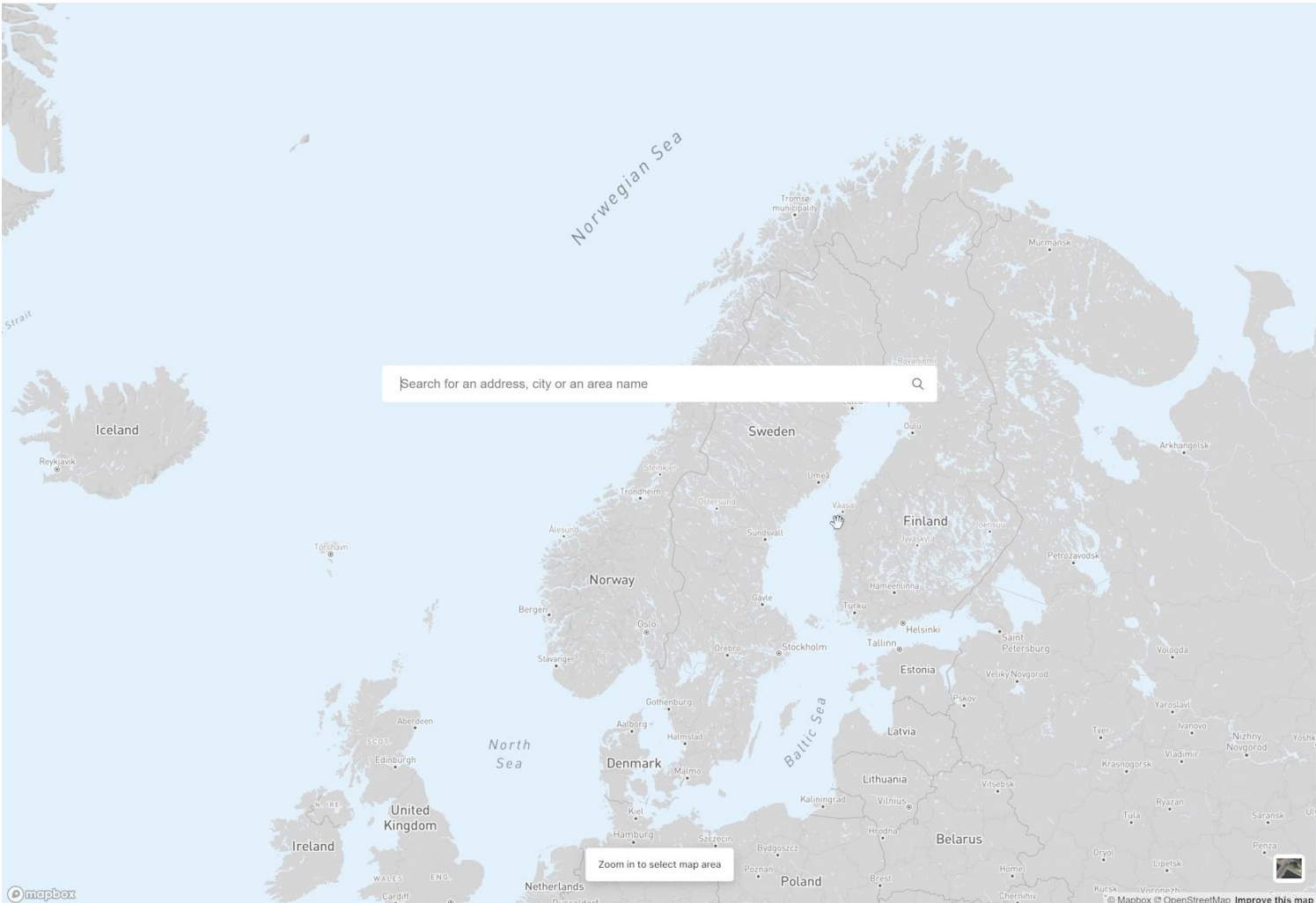
DESIGN & AUTOMATIONS

Design, explore and optimize solutions with ease of use



ANALYSES

Perform real time analysis to evaluate and improve designs



Map area and terrain

The highlighted map area will be where you can add objects and run analyses.

To change the map area size, zoom in and out.

Based on your location, we will order a 3D elevation model of the terrain within the map area from: [Kartverket](#)

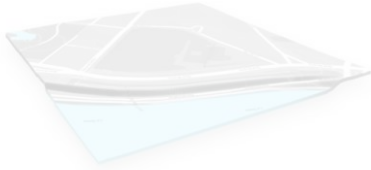
Selected area

Total area	3173091.06 km ²
Area length	2529.49 km
Area width	1254.44 km

[Confirm map area](#)

Zoom in to select map area

Effektive designværktøj og automatisering



CONTEXTUAL DATA

Rapid setup of BIM model with real world contextual data



DESIGN & AUTOMATIONS

Design, explore and optimize solutions with ease of use



ANALYSES

Perform real time analysis to evaluate and improve designs

Émile Anthoine Stadium - Paris, France

Proposals

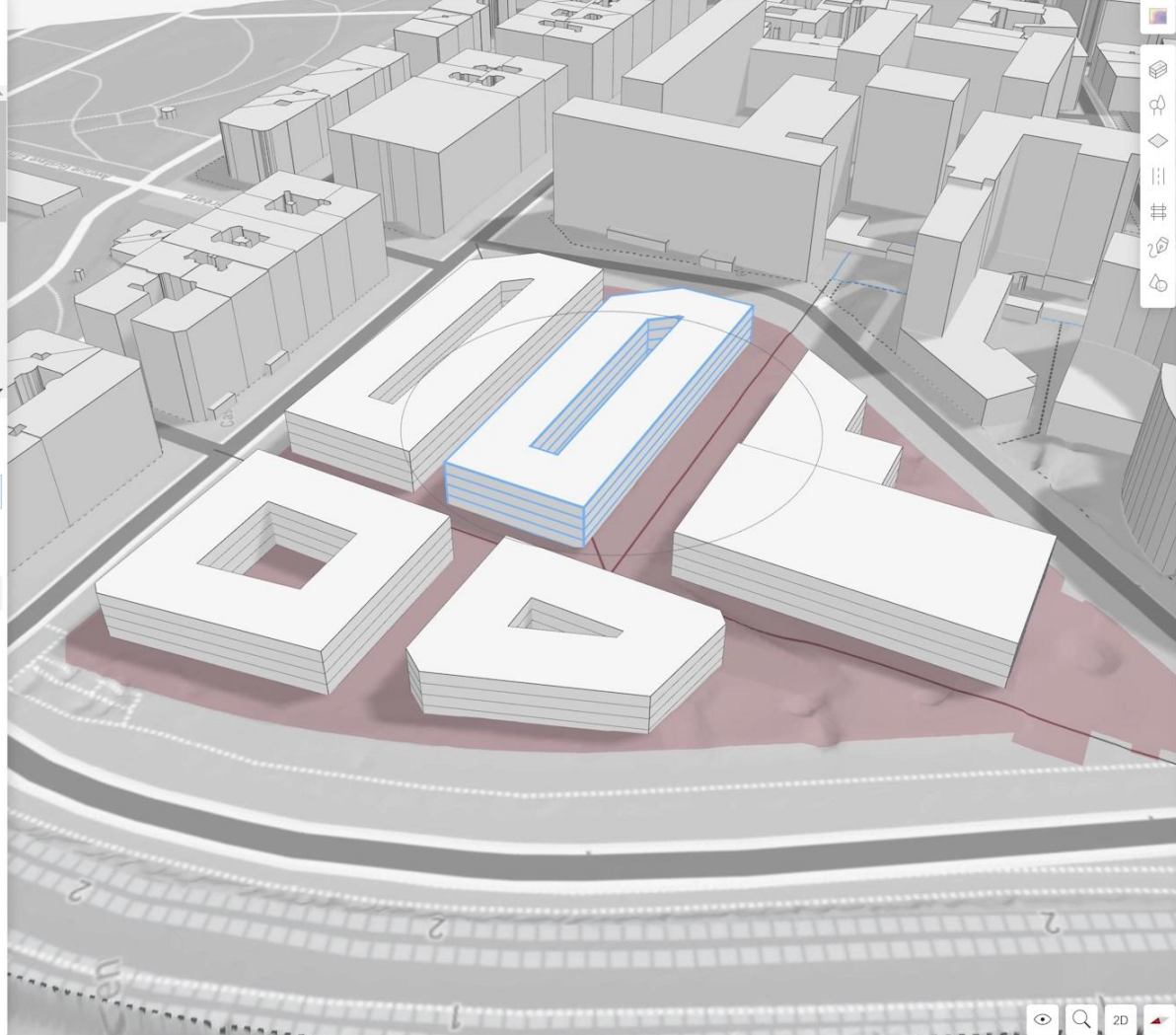
- Grévin 1 day ago B
- Proposal 3** Now C
- Bertoz about 1 hour ago A
- Existing State 1 day ago B
- Karanka A

Proposal layers

- Site limits
- Buildings**
- Generic
- Roads
- Property boundaries

Scenario layers Edit C

- Buildings



Area metrics

Site area

- SHOB - 11,273 m²
- ES - 2,818 m²

Building

Floors

3 m 1

Parking +

Function o

Proposals

- Berlioz copy 2
Today, 2:59 PM
- Berlioz copy
Today, 2:24 PM
- Berlioz copy 1
Today, 11:18 AM
- Karaoke
Mar 17

Proposal layers

- Site limits
- Buildings
- Vegetation
- Generic

Scenario layers

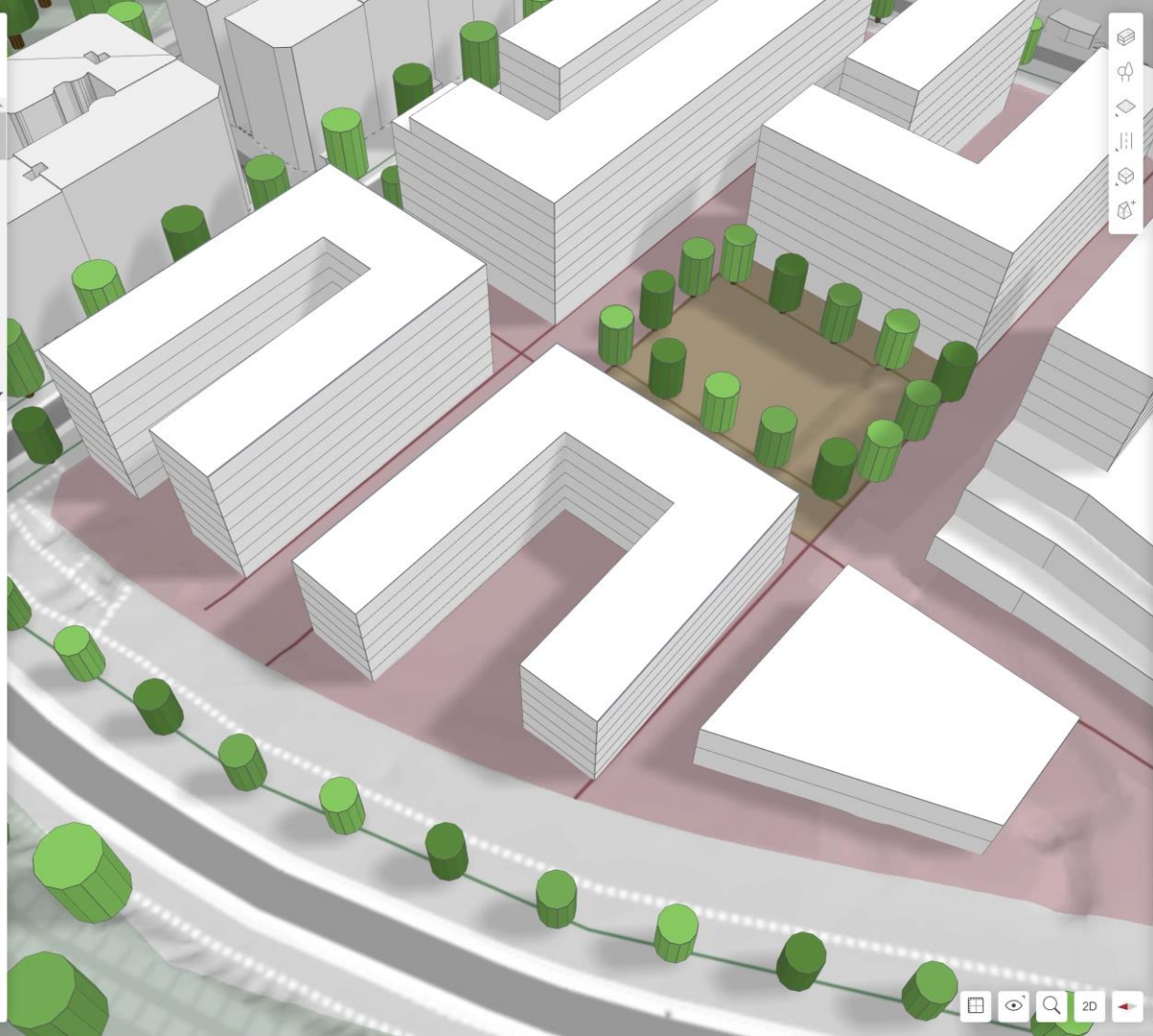
Edit A ▾

- Buildings
- Vegetation
- Roads
- Property boundaries
- Rails

Analyze

- Bar chart icon
- Sun icon
- Lightbulb icon
- Scale icon
- Temperature icon

- 3D view icon
- 2D view icon
- Search icon
- Layers icon
- Home icon
- Help icon

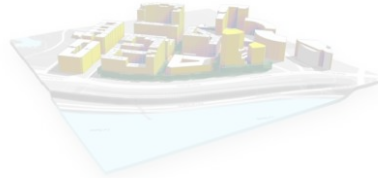


Holistisk overblik gennem analyser



CONTEXTUAL DATA

Rapid setup of BIM model with real world contextual data



DESIGN & AUTOMATIONS

Design, explore and optimize solutions with ease of use



ANALYSES

Perform real time analysis to evaluate and improve designs

Émile Anthoine Stadium - Paris, France

Proposals

- Berlioz copy 2
Today, 2:10 PM
- Berlioz copy 1**
Today, 2:11 PM
- Berlioz copy 1
Today, 11:18 AM
- Karaoke
Mar 17

Proposal layers

- Site limits
- Buildings
- Vegetation
- Generic

Scenario layers Edit A ▾

- Buildings
- Vegetation
- Roads
- Property boundaries
- Rails



Analyze

Area metrics

Site area		27,010 m ²
SHOB	237 %	64,121 m ²
Residential		0 m ²
Commercial		0 m ²
Unspecified		64,121 m ²
Parking		0 m ²



Case:
Bergen Kommune



Case: Bergen Kommune





Case: Bergen Kommune





Case: Bergen Kommune

Skole og oppvekst



Luftforurensing

Rød sone for luftkvalitet (H_390_1) utelukker hele område 2 samt deler av område 1 og 3 for plassering av skole og barnehage iht. § 23.1.2 i KPA2018



Undersøelsesområde 1-3 (Møhlenpris - Frielenes - Dokkeskjærskaien/Gassverket)

Støy

Ny bebyggelse langs Bybanen i område 1 og 3 vil skjerme mulige uteområder for støy slik at retningslinjer i T-1442 kan tilfredstilles.

Solbelyste utearealer

Begge tomtene i områder 1 og 3 er har gode solforhold med uteareal som er solbelyst i mer enn 4 timer ved vårvendagn. Område A er sentralt plassert på Dokken, tett ved bybanestopp, sykkelnettverk, Akvariet og HI/Fdir. Område B ligger tett ved Møhlenpris skole og vil være en naturlig utvidelse av et oppvekststun som det er behov for allerede i dag.

Case: Bergen Kommune



Frielenes-området

Blandet med små og store kvartaler

Små og medium kvartal

- #1 - ca. 60 boenheter / Gårdsrom 770 m²
- #2 - ca. 50 boenheter / Gårdsrom 423 m²
- #3 ca. 70 boenheter / Gårdsrom 405 m²

Stort kvartal

- #4 - ca. 100 boenheter / Gårdsrom 1416 m²
- #5 - ca. 120 boenheter / Gårdsrom 1218 m²
- #6 - ca. 120 boenheter / Gårdsrom 1890 m²

Totalt antall boenheter: ca. 520 boenheter
Totalt areal gårdsrom: 6122 m²



Offentlig tilgjengelig uteareal:

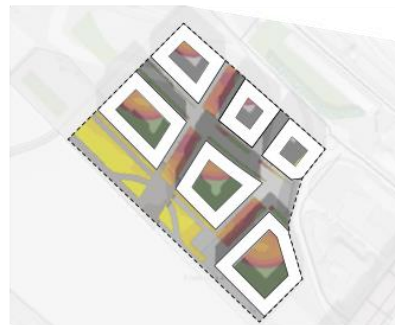
- #A - Strandpark: 5080 m²
- #B - Allmenning: 1833 m²
- #C - Lommepark: 826 m²

Totalt offentlig tilgjengelig uteareal: 7739 m²

Totalt uteareal i Frielenes-området: 13861 m²

Arealkrav til uteareal KPA2018 § 14.3.1

15 m² per boenhet
derav 10 m² på bakkeplan



Krav til Frielenes-området

Totalt MUA: 520 boenheter x 15 m² = 7800 m²

Derav på bakkeplan: 520 boenheter x 10 m² = 5200 m²

Gårdsrom i små kvartaler har for små dimensjoner til å klare å tilfredstille krav om solbelyst uteareal på egen tomt.

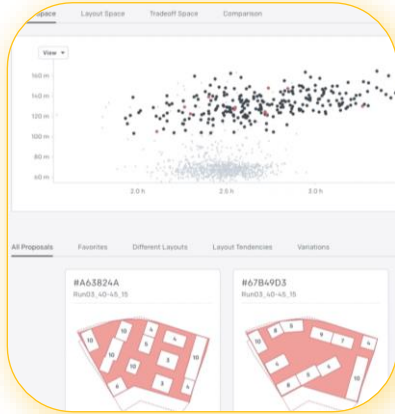
Store kvartaler klarer å tilfredstille kvalitetskrav om solbelyst areal dersom byggehøyde i sør er lav.

Offentlig tilgjengelige utearealer er solfytte og byr på mye areal.

Dermed må utearealene til små kvartaler, der gårdsrommene ikke tilfredsstiller kravene til sol, løses i offentlig tilgjengelige utearealer som park, gatetun, torg. e.l.

AI

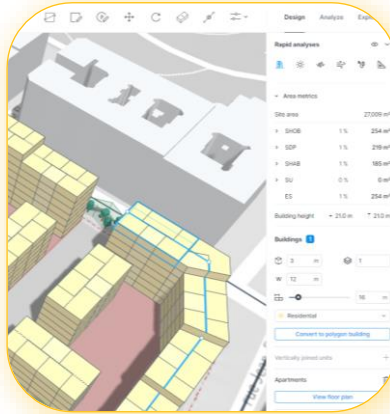
Forma har skiftet tilgang til AI



Spacemaker.AI

Gen 1 - 2018

“AI First”



Spacemaker

Gen 2 -2019

“AI on the shoulder”



Forma

Gen 3 -2023

“AI as a feature”

Udfordringer med AI

Udfordringer med AI

Tillid

Hvilken grad af automatisering er vi komfortable med?

Datagrundlag

Hvor digitale er branchen?
Er vores data vedligeholdt, troværdig og generel?

Specifikt vs. generelt

Hvad en fællesnævneren der kan skabe værdi for flest mulig kunder?

Forma bruger AI til vejlede brugerne gennem komplekse problemer.

Hurtige analyser

Vind

Energi i drift

Støj

(CO2 beregning)

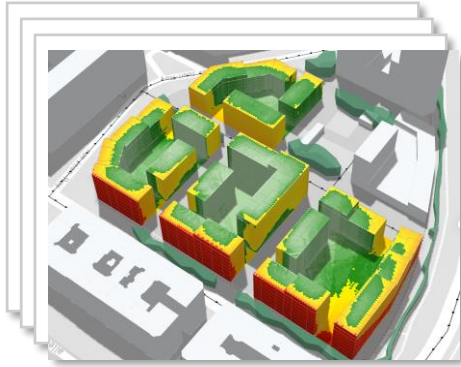
Generativ design

Byområder

(Lejligheder)

(Begrænsninger + ønsker)

AI trænes på Forma-genererede datasæt



Støjanalyse beregnet
i Forma



Machine Learning køres på
internt datasæt (20.000+)



Instant Noise
Analysis

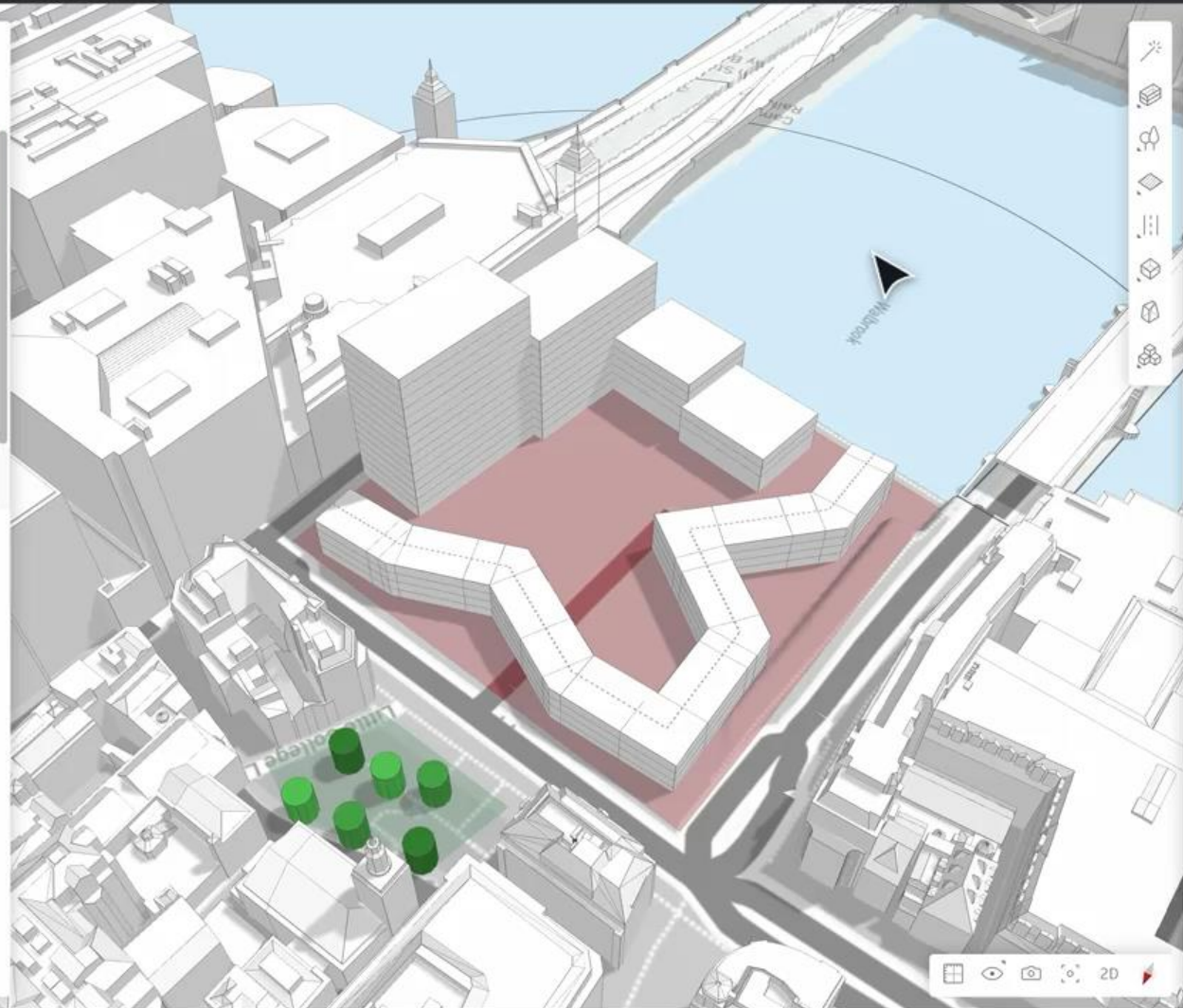
UK Forma

Proposals

- 1_Baseline Today, 19:49
- 5_Sketch ready Jul 11
- 3_Sketch setup Jul 11
- 4_Import Example Jul 11

Layers

- Buildings
- Terrain
- 3_Site setup
- Site limits
- Vegetation
- Generic
- Roads
- Zones



Analyze Site limit 50e • Site limit 4 ::

Area metrics

Site area		16,255 m ²
BC	33 %	5,427 m ²
GEA	228 %	36,982 m ²
GIA	205 %	33,284 m ²
NIA	184 %	29,955 m ²
Efficiency factor		0.90
Number of units		0
Parking		0 m ²

© Mapbox © OpenStreetMap. Improve this map

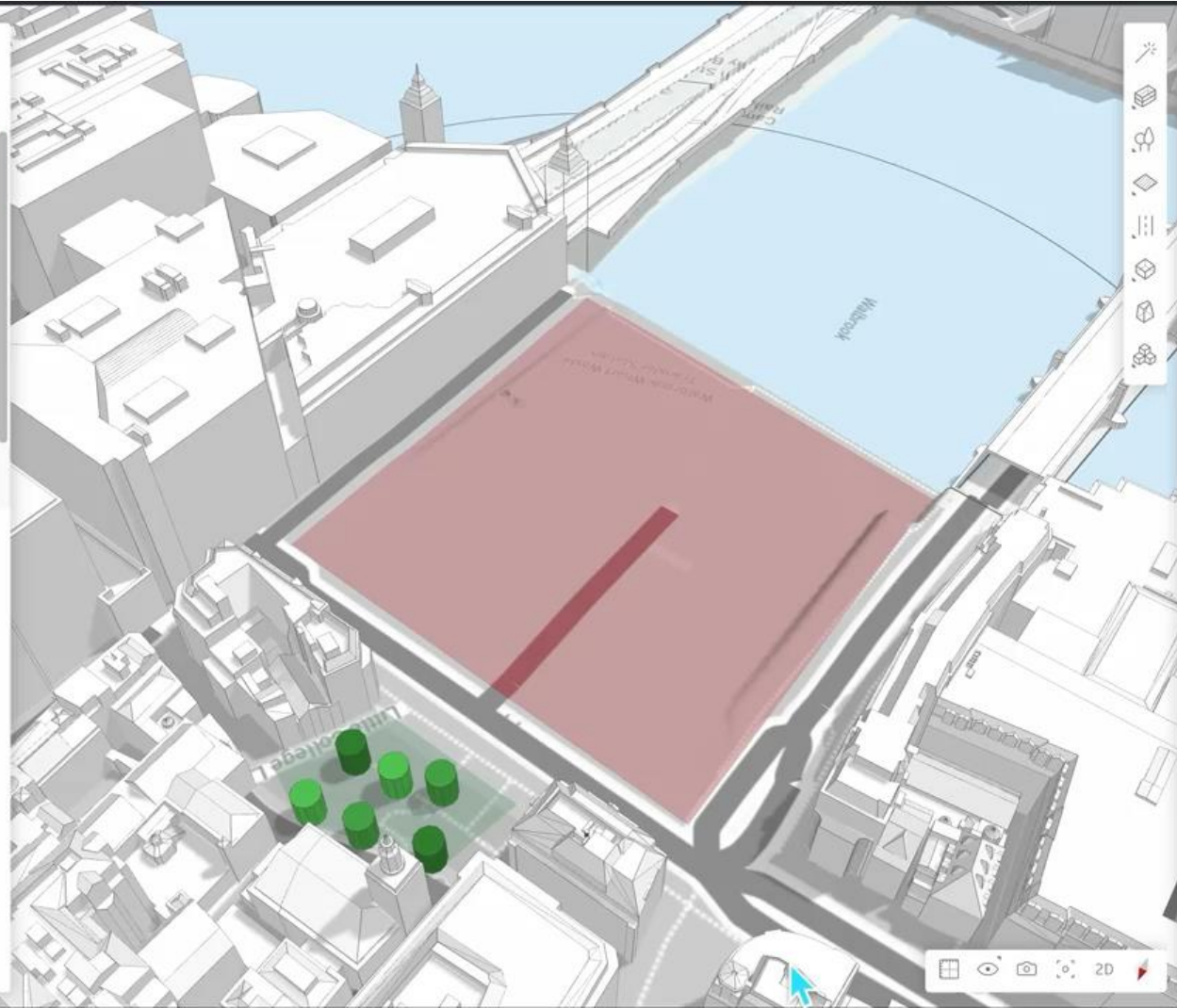
UK Forma

Proposals

- 1_Baseline**
Today, 20.00
- 5_Sketch ready
Jul 11
- 3_Sketch setup
Jul 11
- 4_Import Example
Jul 11

Layers

- Terrain
- Elements that are unique for a proposal will be listed here.
- 3_Site setup
 - Site limits
 - Vegetation
 - Generic
 - Roads
 - Zones



Tools and navigation icons including a sun, a cube, a lightbulb, a diamond, a vertical line, a cube, a cube, and a cube.

Analyze Site limit 50e • Site limit 4 ::

Area metrics

Site area		16,255 m ²
BC	0 %	0 m ²
> GEA	0 %	0 m ²
> GIA	0 %	0 m ²
> NIA	0 %	0 m ²
Efficiency factor		0.00
Number of units		0
> Parking		0 m ²

Help

AI i analyser og generativt design

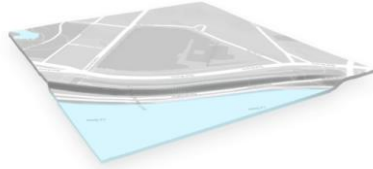




SAMARBEJDE

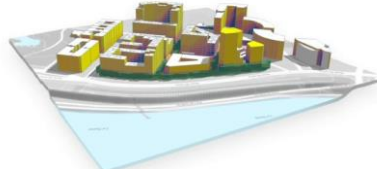
Workflow i Forma nu

FORMA NATIVE CAPABILITIES



CONTEXTUAL DATA

Rapid setup of BIM model with real world contextual data



DESIGN & AUTOMATIONS

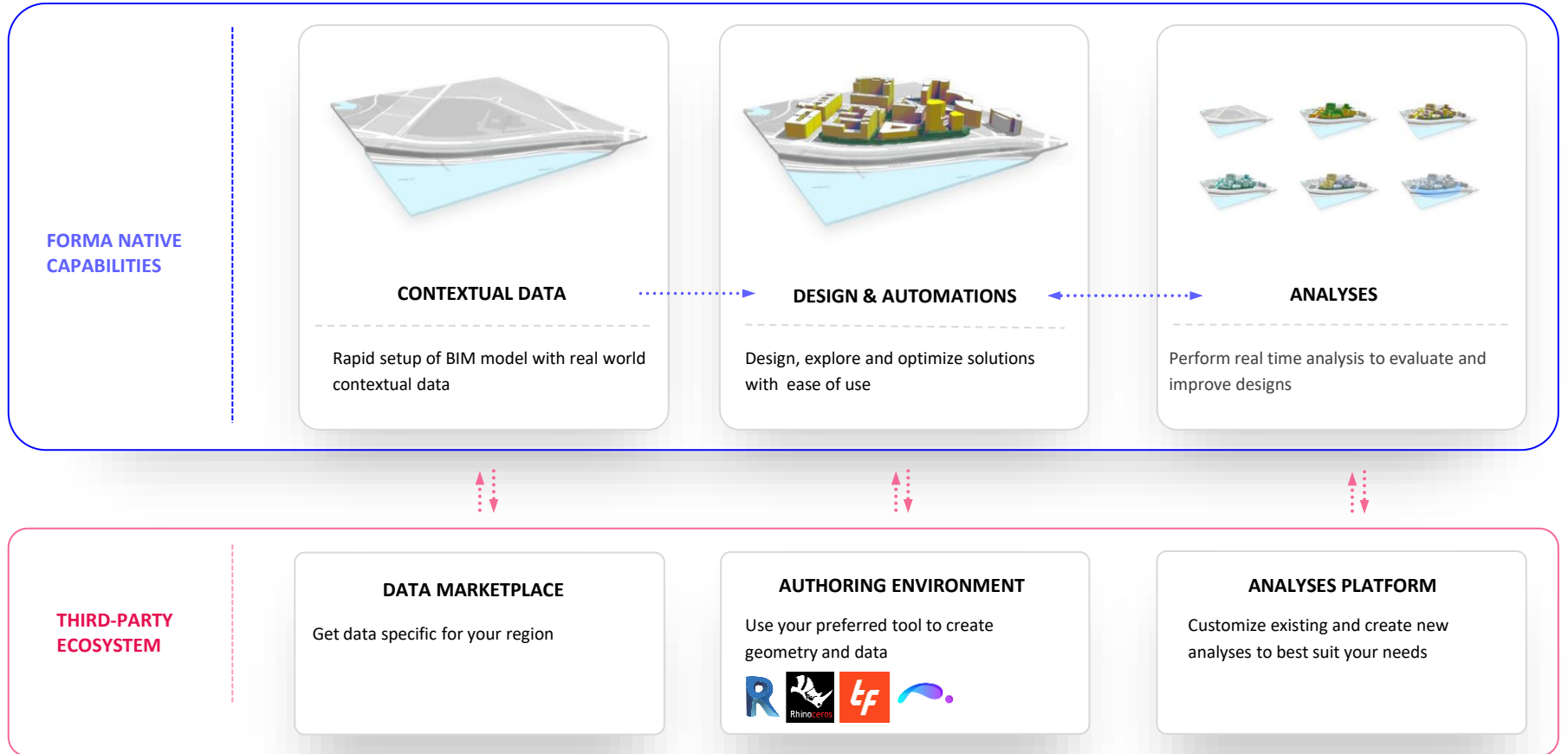
Design, explore and optimize solutions with ease of use



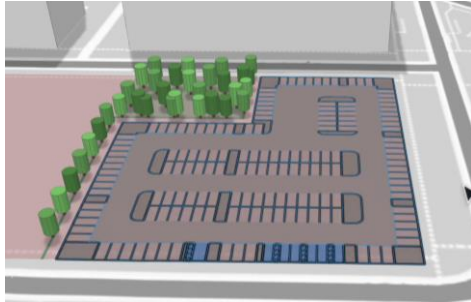
ANALYSES

Perform real time analysis to evaluate and improve designs

Platform: workflow i Forma gennem samarbejde



Extensions: muligheder gennem samarbejde



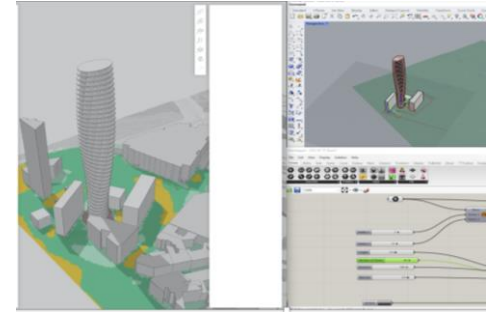
Testfit

Parametrisk
parkeringsgenerering



Shapediver

Kører Grasshopper- scripts
i Forma for at generere
geometri.



Rhino

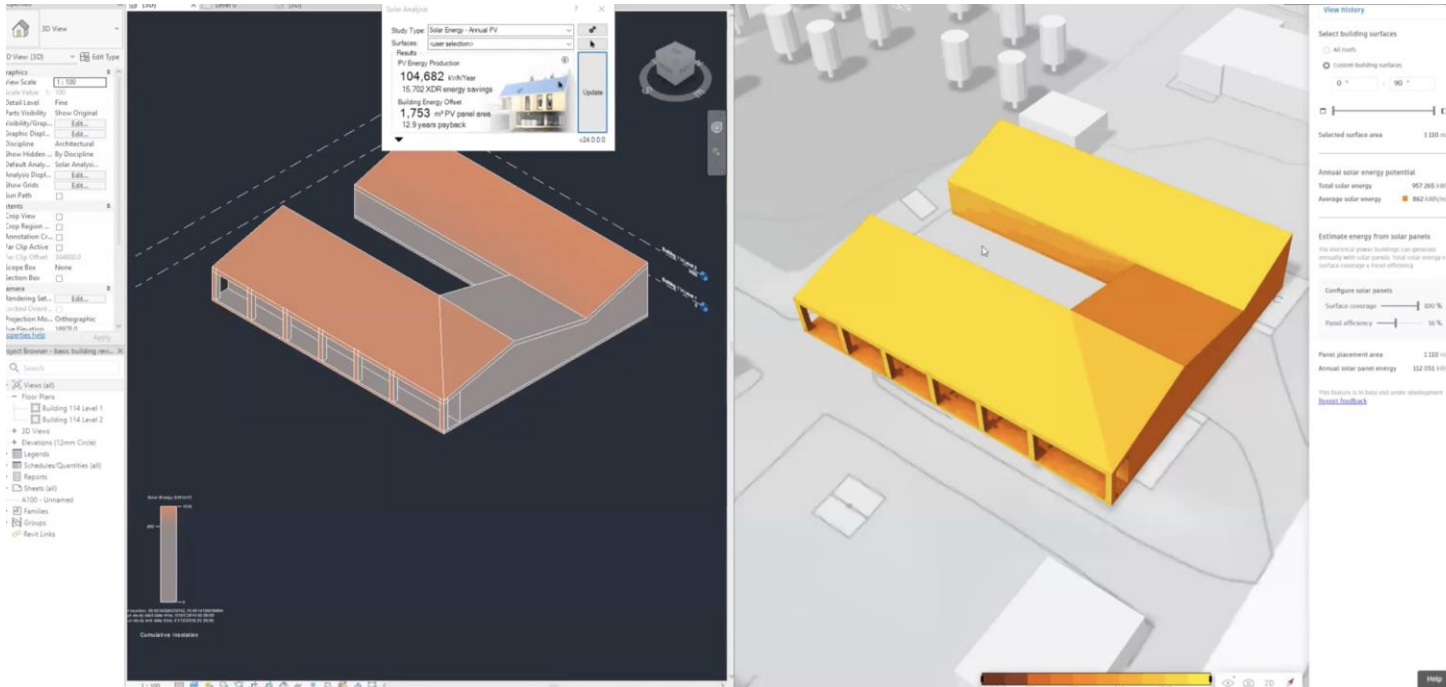
Direkte link mellem Rhino
og Forma.

Design i Rhino + analysér i
fuld geolokaliseret
kontekst i Forma.

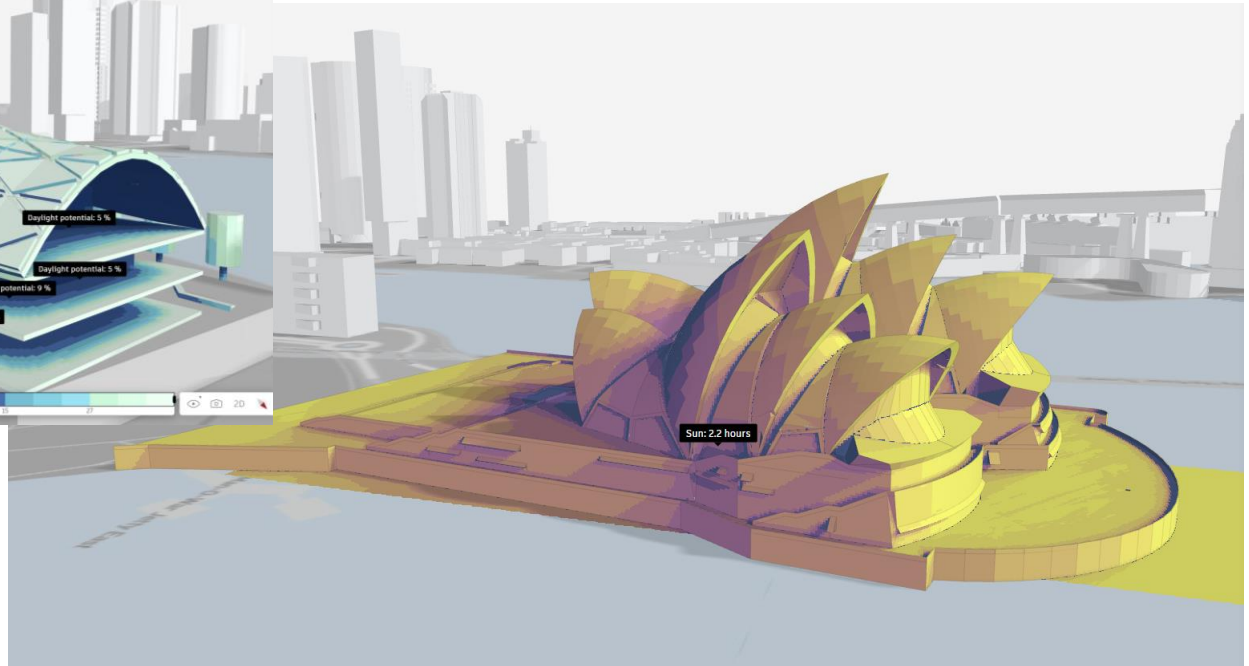
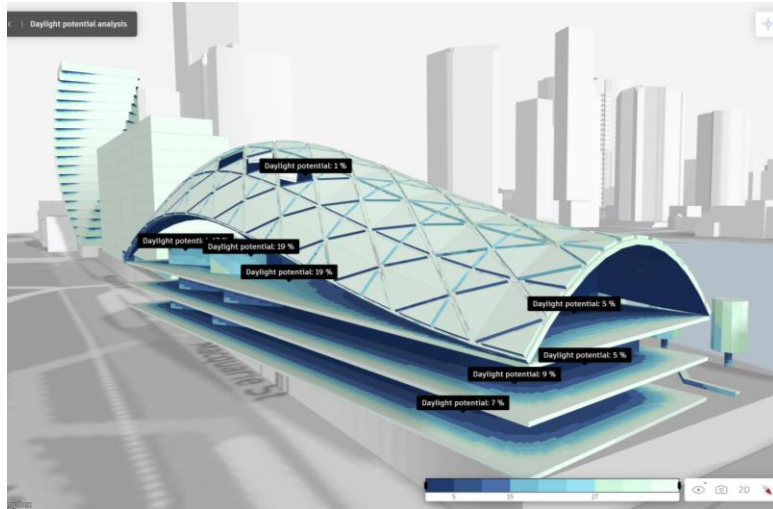
Extensions: revit



Extensions åbner nye workflows: Forma til Revit til Insight

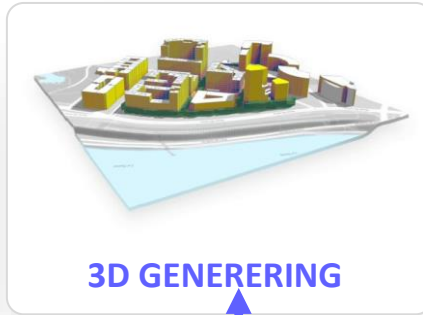


Extensions åbner nye workflows: Revit til Forma for analyse

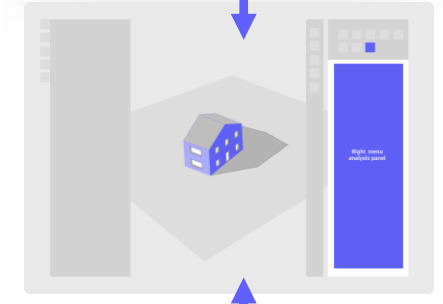
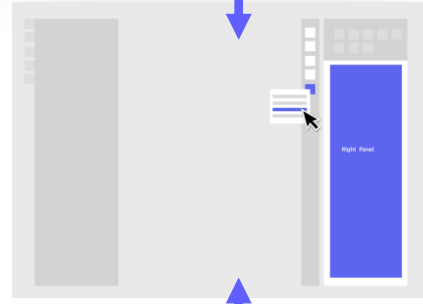
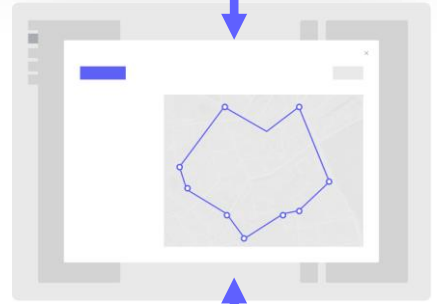


Forma API'er er bygget for at være nemme

Forma



API'er



Opsummeret

Vi skal løse komplekse problemer

Bæredygtighed, urbanisering, biodiversitet og klima, kræver tværfaglig indsigt og handling.

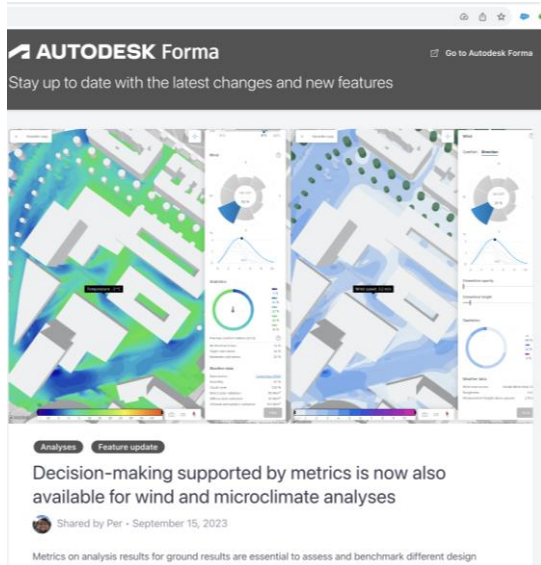
Vi skal have alle med om bordet

Løsninger skal inkludere alle berørte parter. Det skal være nemt at forstå og bidrage til process og resultat.

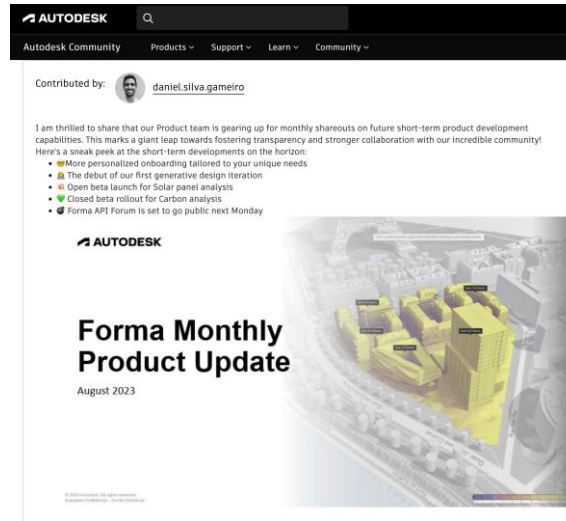
AI er en del af løsningen

AI er en del af løsningen, men ikke alene.

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