New Stavanger University Hospital

Hospital Engineering Trends 2025

Florian Wagnerberger

25.06.2025

DRAFT

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Architecture / Interior Design

Urbanism / Sustainability

Innovation / Design Technology

Infrastructure / Commercial

Residential / Hospitality

Culture / Education

Healthcare / Industry

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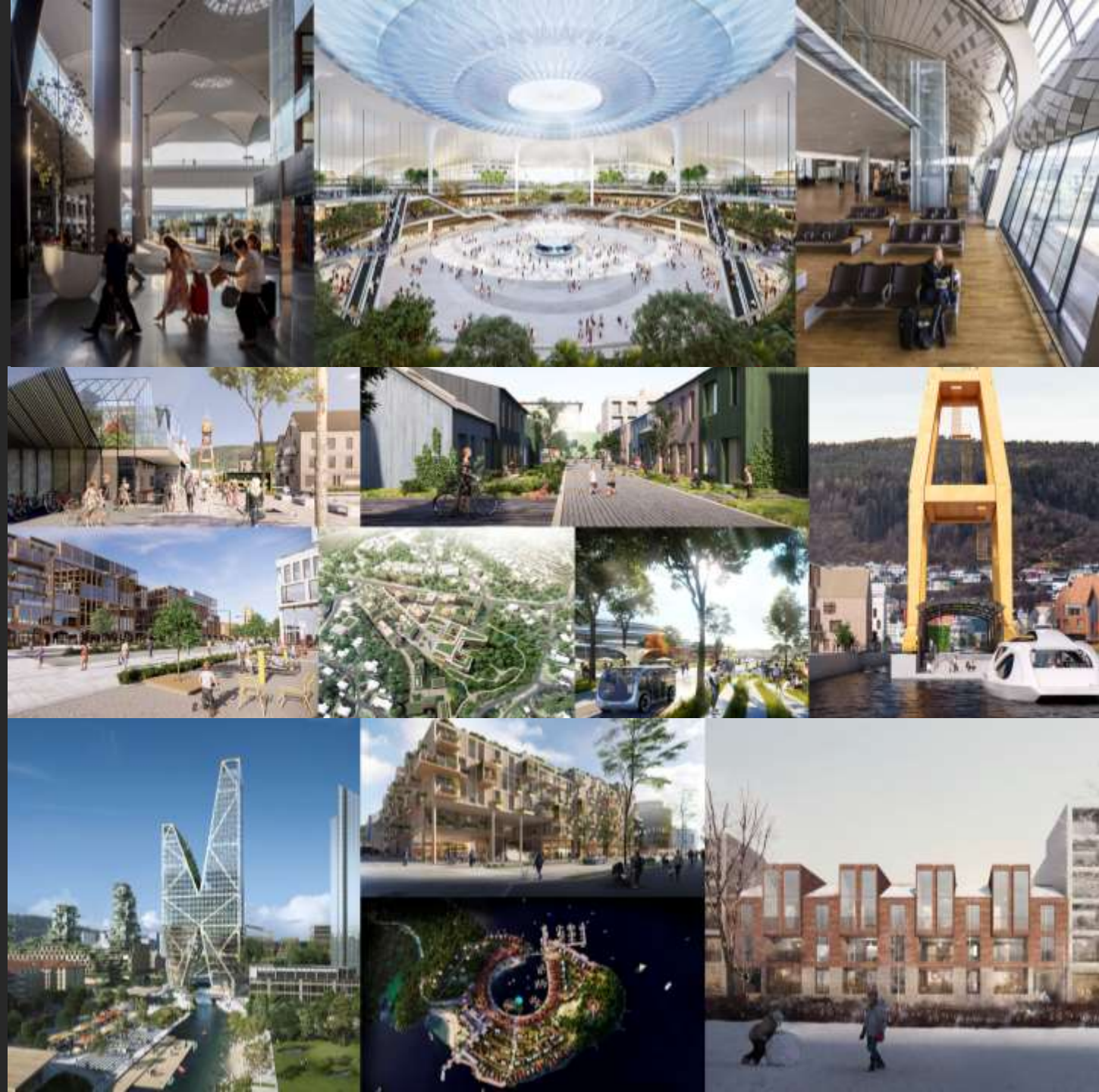

400

People
from over

30

different
Nations

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5

Oslo
Reykjavík
Copenhagen
Aarhus
Aalborg

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Infrastructure

Oslo Airport

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Infrastructure

Istanbul Airport

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Office / Commercial

Government Quarter Oslo

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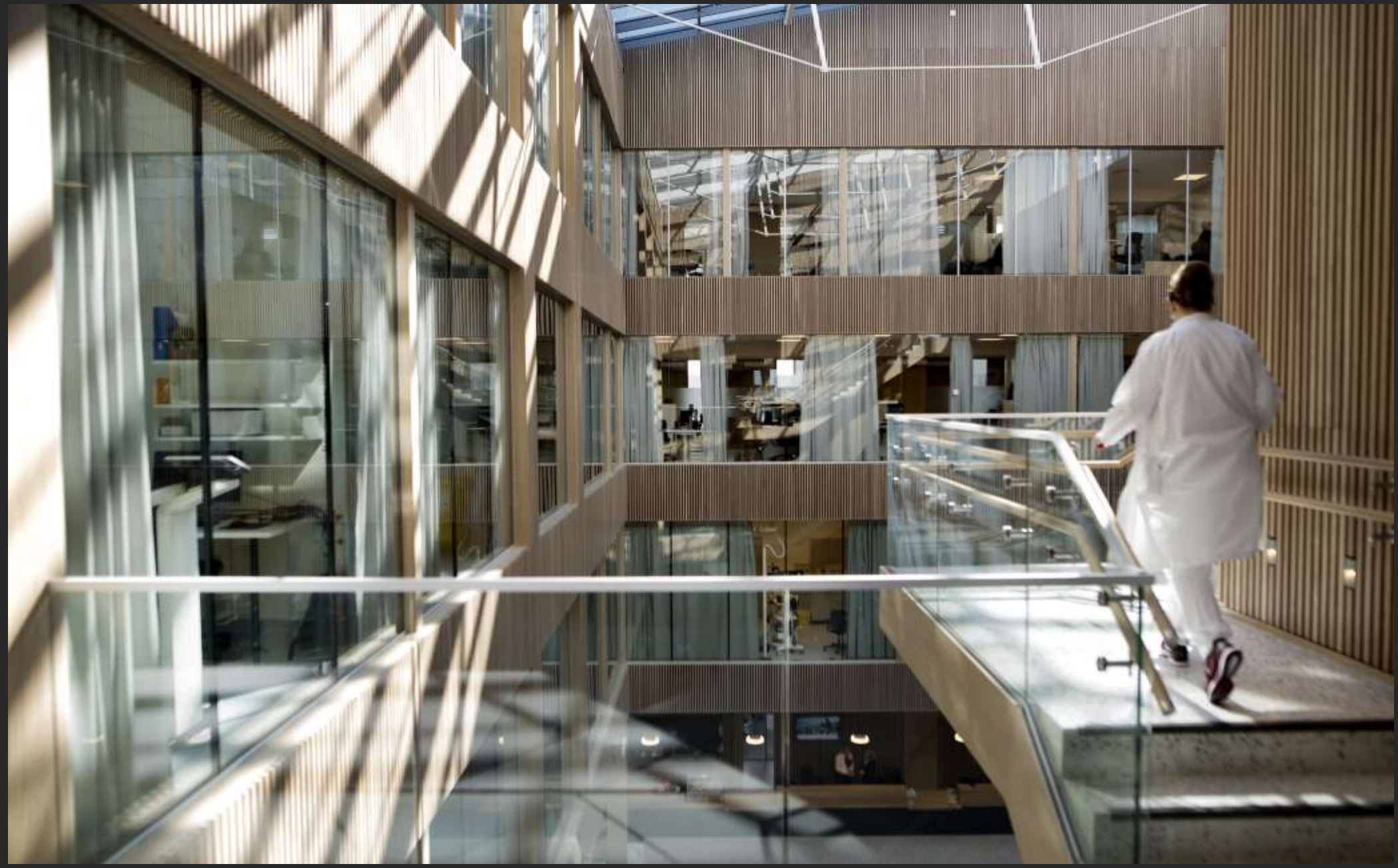
Healthcare

LHL-hospital
Gardermoen



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Healthcare

Oslo
Emergency
Clinic

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Healthcare

Åsaheimen
Care home
Bergen

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Healthcare

Carpe Diem
Dementia Village
Bærum

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Healthcare

Stavanger
University
Hospital

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The Stavanger story

Creating Innovative Healthcare on a Budget

- Background and figures
- Hospital concept
- Innovation
- Digitalisation
- Industrialization

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STAVANGER UNIVERSITY

Modernizing and relocating the existing hospital

2015 – planning begins

3 conceptual designs for 3 different locations

A site near Stavanger university is chosen

2018 – construction begins for building phase 1

2020 – 20 000 extra square meters added

2024 – building phase 1 mechanically ready

2025 – start of operations

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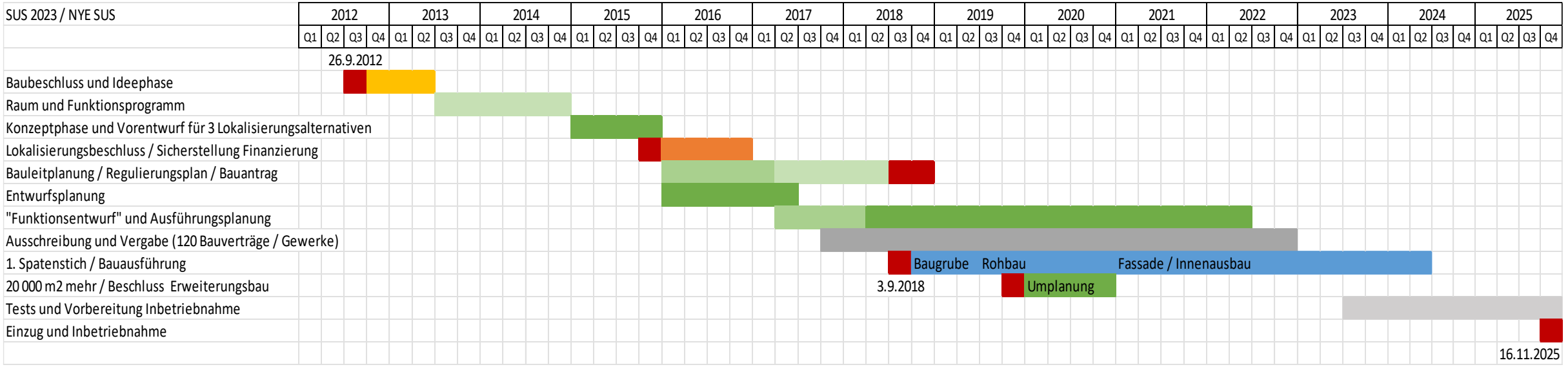

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Ullandhaug

Våland

Stokka

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Illustration from 2017
before construction start
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NEW STAVANGER UNIVERSITY HOSPITAL – NYE SUS

BUILDING PHASE 1 – THE “ACUTE” HOSPITAL

HELSE STAVANGER SERVES	340 000 PEOPLE IN ROGALAND
TOTAL GROSS AREA	142 000 SQUARE METERS
FACADE AREA	64 000 SQUARE METERS
PROJECT COST	OVER 12 BILLION NOK
	(± 1 BILLION EUROS)
PATIENT BEDS	**650**
SINGLE ENSUITE BEDROOMS	± 550
OPERATIONAL THEATRES	20 (INCL. 1 HYBRID & 2 ROBOT)
DELIVERY DEPARTMENT	13 DELIVERY ROOMS
BIG EMERGENCY DEPARTMENT	INCL. SHORT TERM CARE
ICU	18 BEDS
NICU	20 – 25 BEDS
HIGH ISOLATION CARE UNIT	13 BEDS
DIAGNOSTIC IMAGING	5 MR, 5 CT, ++
INTERVENTIONAL RADIOLOGY	AND CARDIOLOGY – 5 ROOMS
NUCLEAR MEDICINE	RADIATION THERAPY
CLINICAL LABORATORIES	ON 10 000 SQUARE METERS
VARIOUS AMBULATORY CARE	AND MUCH MORE …
BUILDING CONTRACTS	130
INCL. ACCESS ROADS	TECHNICAL INFRASTRUCTURE
2 PARKING GARAGES	FOR IN TOTAL 900 CARS
NORWAY'S BIGGEST INDOOR	BICYCLE GARAGE (2000 BIKES)
EQUIPMENT CONTRACTS	APPROX. 100

St. Olavs University Hospital, Trondheim

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Urban Development Studies

University of Stavanger

A string of city squares along a public transport axis

3RW / Smedvig

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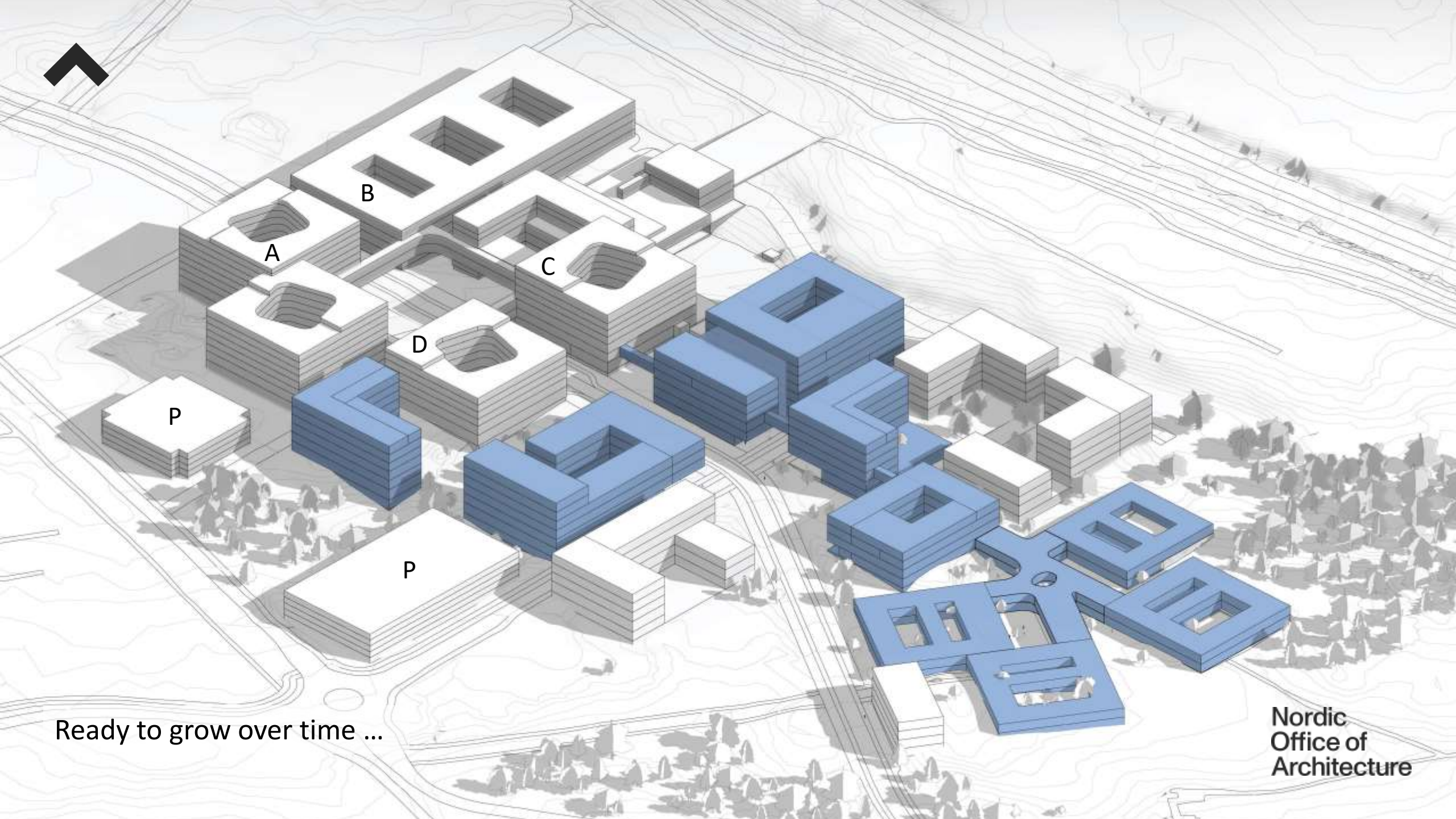
The hospital built as a city around a central square



Ready to grow over time …

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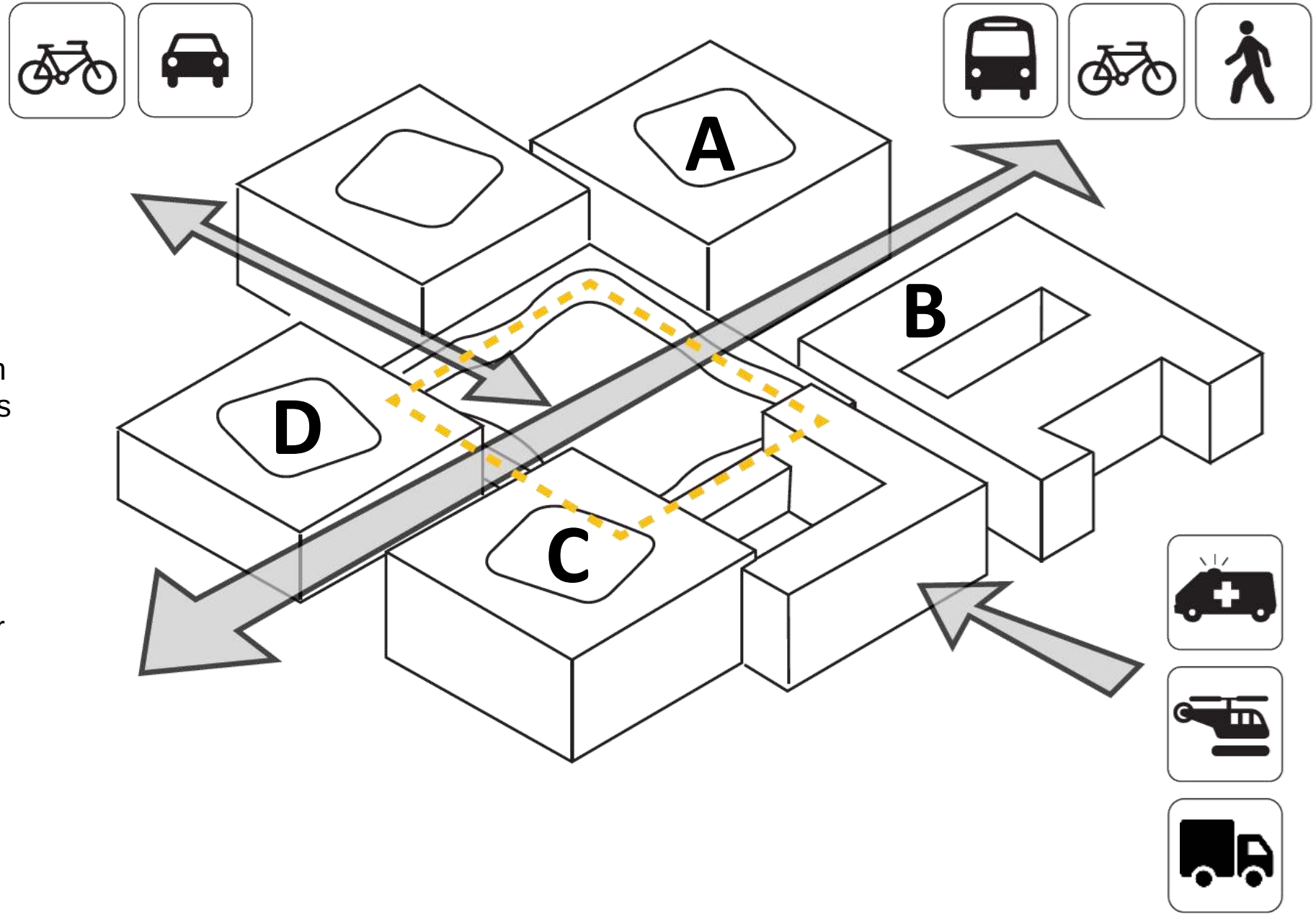
Traffic & logistics -
A sustainable approach:

- Carparking limited to 900 places (staff and visitors)
- Public transport right «through» the hospital with Highly frequented bus-lines all day
- 2000 bicycle parking places under roof and with extra services like e-bike-charging, air pumps, repair and cleaning stations



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THEY DO THINGS DIFFERENT IN STAVANGER ...

50 years of experience in construction for the Oil industry

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THE TIMES

TOR Lindsay Cook

FRIDAY MAY 12 1995

New Eighth Wonder candidate

THE final phase of Europe's largest gas project was launched yesterday by Norske Shell with the towing into the North Sea of the Troll platform, the world's tallest concrete structure (Carl Mortished writes).

The million-tonne structure, is designed to survive in near-hurricane conditions for 50 years. Shell discovered the Troll field in 1979, but the £3 billion project was not started until 1986. Construction of the facility, by Aker, the Norwegian contractor, began in 1992 and the first gas is expected to flow next April.

The huge reserves of the Troll field will supply 10 per cent of Europe's gas over the next 50 years via pipelines across the North Sea. Contracts have been signed to supply gas to France, Germany, Belgium, The Netherlands, Spain and Austria.

Hans Meijer, director of exploration and production for Norske Shell, said the project was on schedule and on budget. "Many people claim to have built the Eighth Wonder of the world," he said. "I believe that today Shell has joined that queue."

ur days to pull Shell's 472-metre concrete and steel platform from Stavanger, Norway, to the Troll field 80 km northwest of Bergen where it will be submerged 300 metres

Shell gloom, page 28

Our task:

To build hospitals better (and cheaper)

Through more:

- **Innovation**
- **Digitalization**
- **Industrialization**

by involving the innovation potential
of the local (oil-) industry

Our answer…

- **Rethink hospital logistics**
- **Rethink general building & installation methods**

- **BIM for everybody** in planning **and building**
  -> no paper drawings on the building site
  -> 3D model to be used of all contractors

- **Standardize** for **more flexibility**
  in planning & building
- **Define modules** for **more prefabrication**
  and building off site
- **LEAN planning & building**

- **A contract strategy** suitable for involving
  local enterprises

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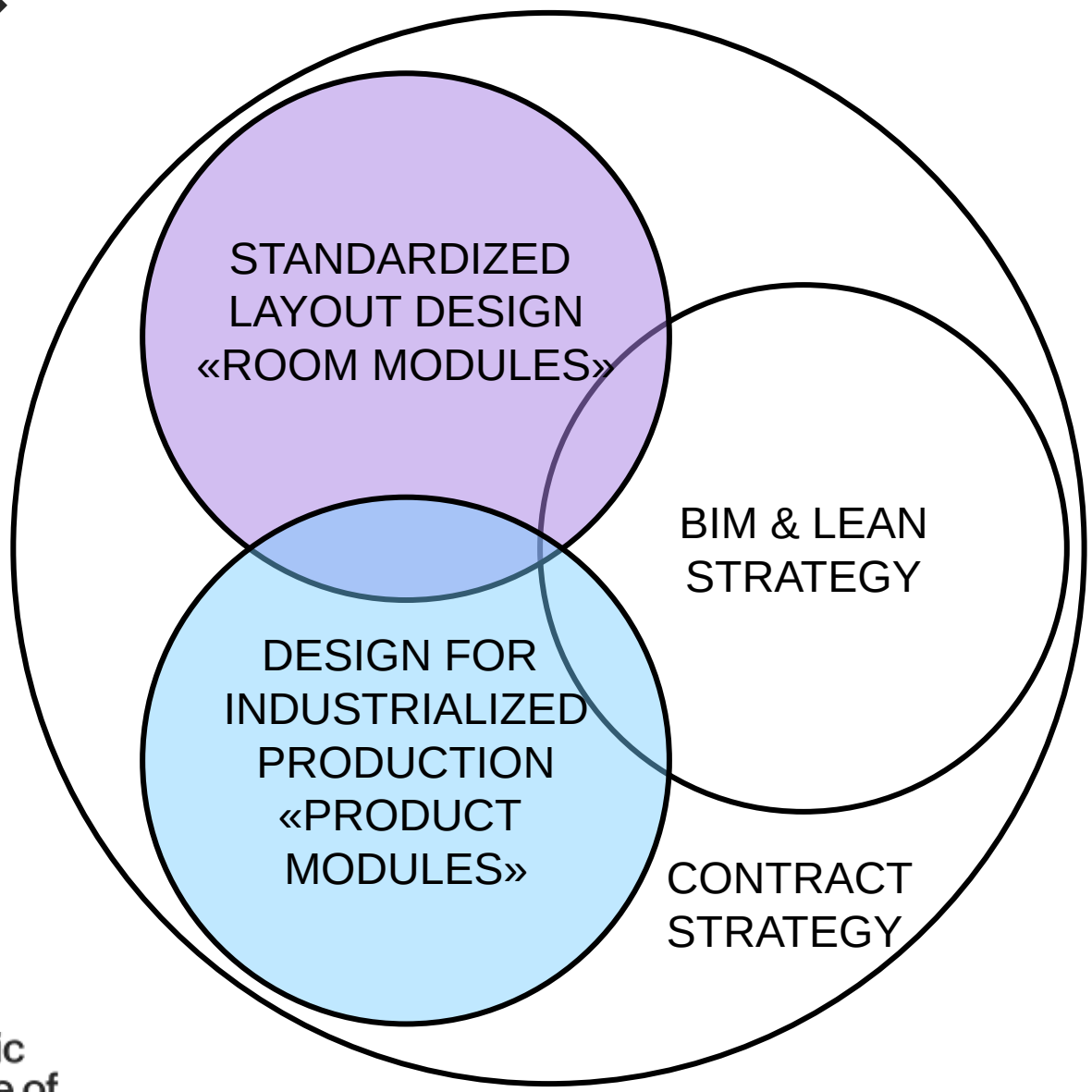

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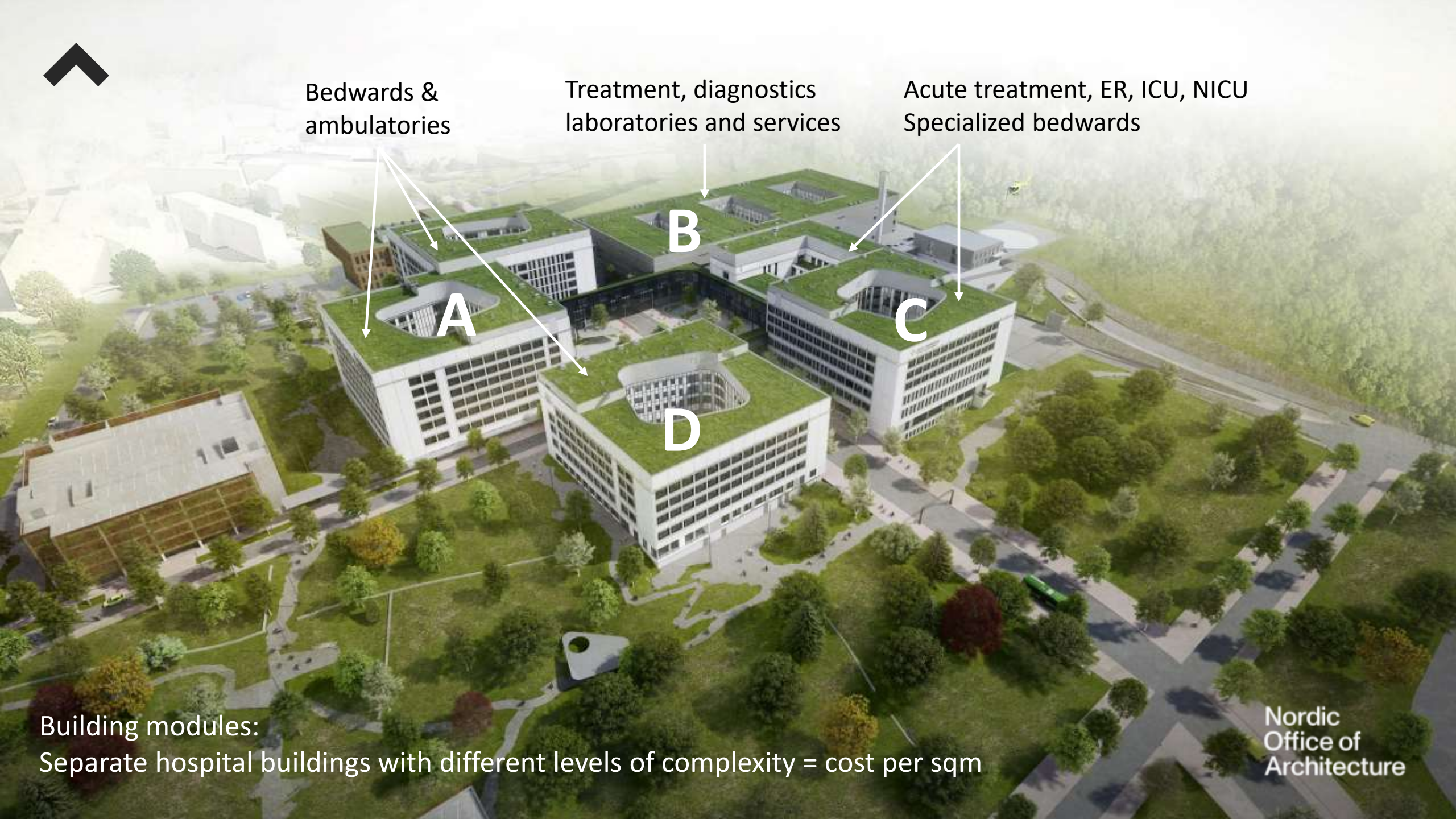
MODULAR” DESIGN” APPROACH

Some expected benefits:

- More flexibility in planning period (changes)
- Flexibility in use (conversions made easier)
- Better quality due to offsite production
- Efficient scheduling of construction activity
- More control (of cost, time & quality)
- Activating the local construction marked
- Overall positive effect on construction costs
- Minimizing Waste on site
- Design to dissemble
- and more…



Building modules:
Separate hospital buildings with different levels of complexity = cost per sqm

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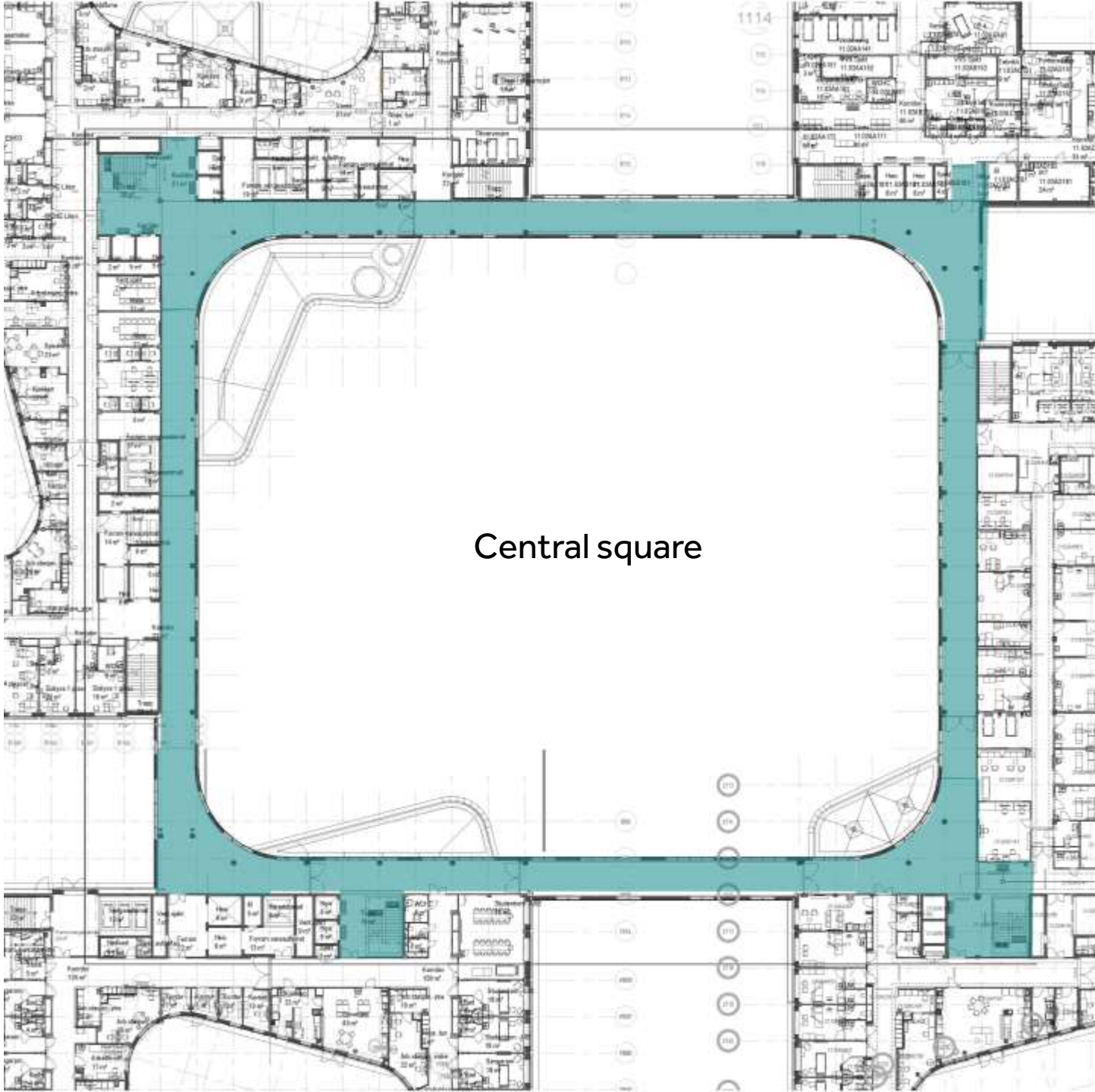
Communication ring

Corridor system above ground connecting all main buildings :

- Public access on level 02
- Hospital transport on level 03



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Communication ring

Connecting the hospital horizontally and vertically on 3 levels:

- **Second Floor (E03): Patient transport**
- **First floor (E02): Public access**

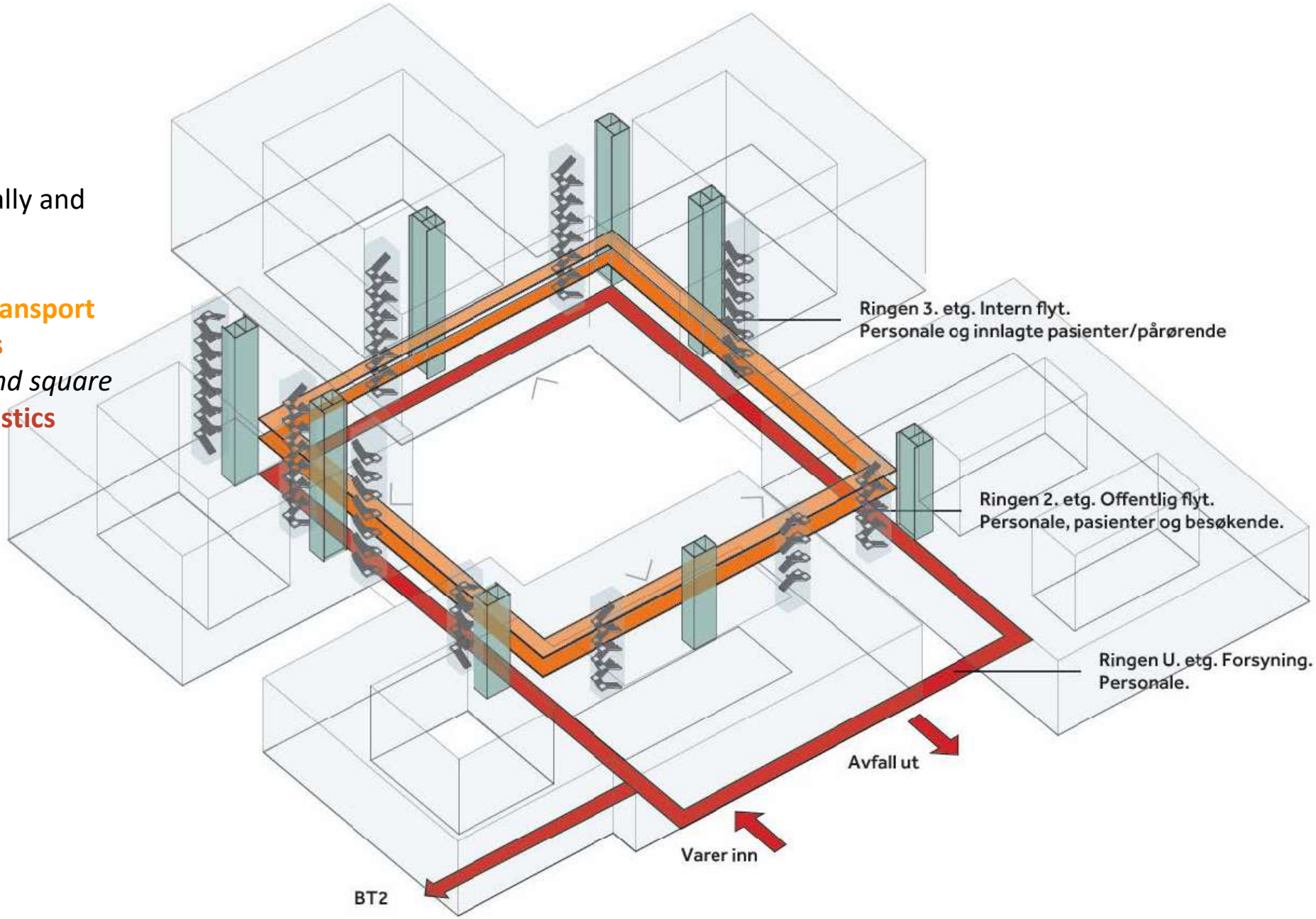
Ground floor (E01)-> entrances and square

- **Basement (E-1): staff and logistics**

All main elevators and stairs are connected to the ring.

And in addition:
Innovative vertical Logistic technology systems for

- Hospital beds and
- General supplies



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Automated vertical storage for patient beds and equipment

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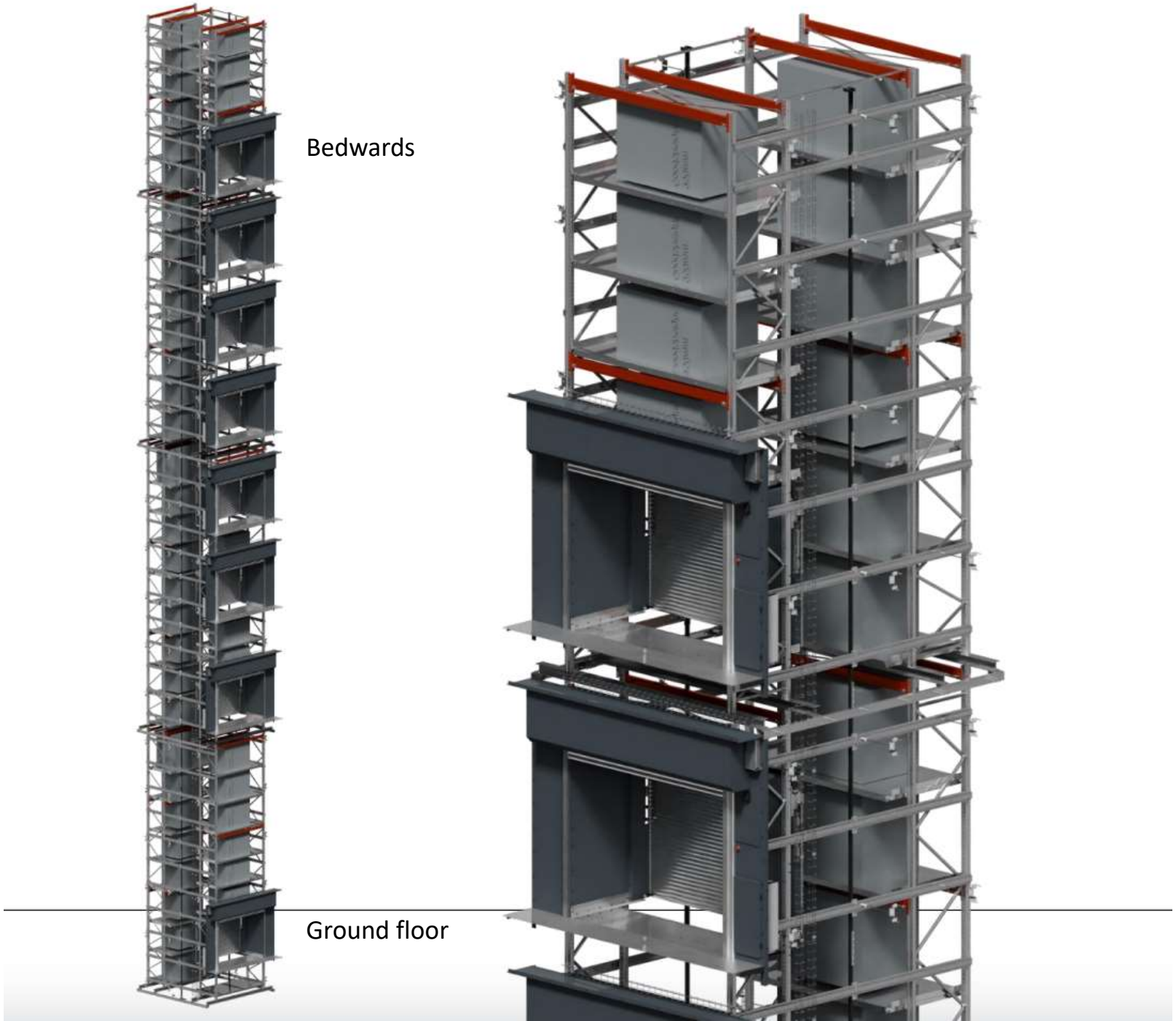
EFFIMAT

Automated vertical storage for patient beds and equipment



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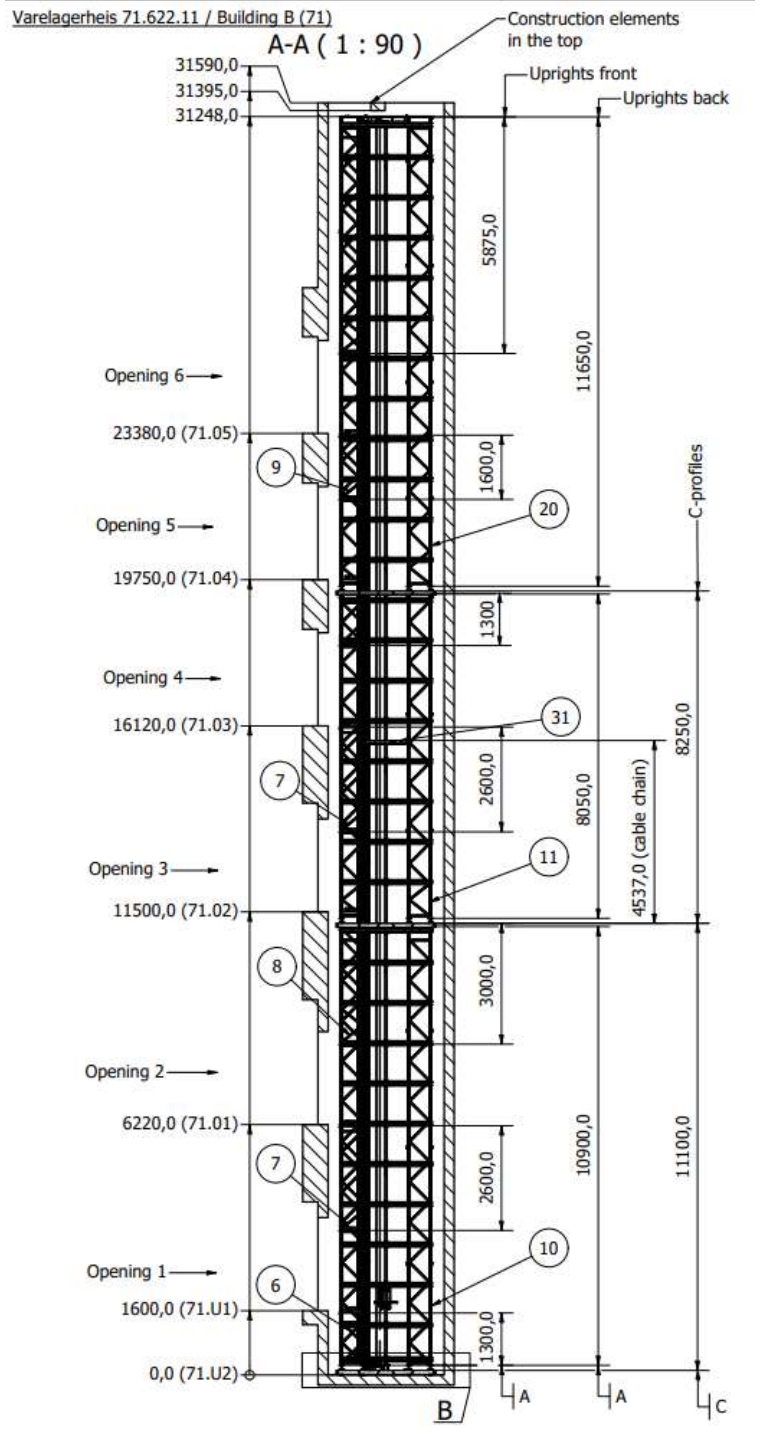
EFFIMAT

Automated vertical storage systems for general supplies



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Automated vertical storage systems for general supplies

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Autonomous Mobile Robot logistics system (AMR)

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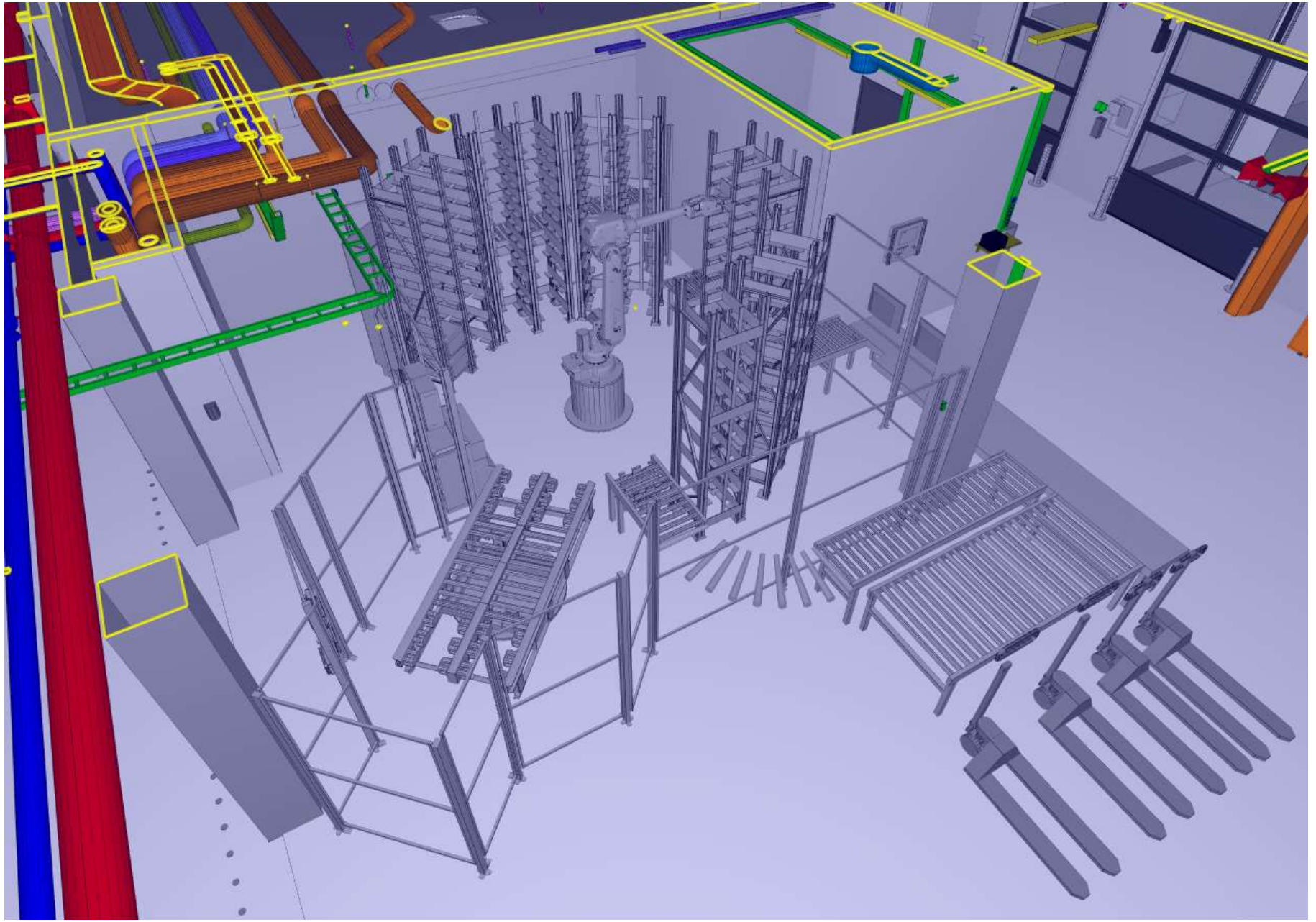
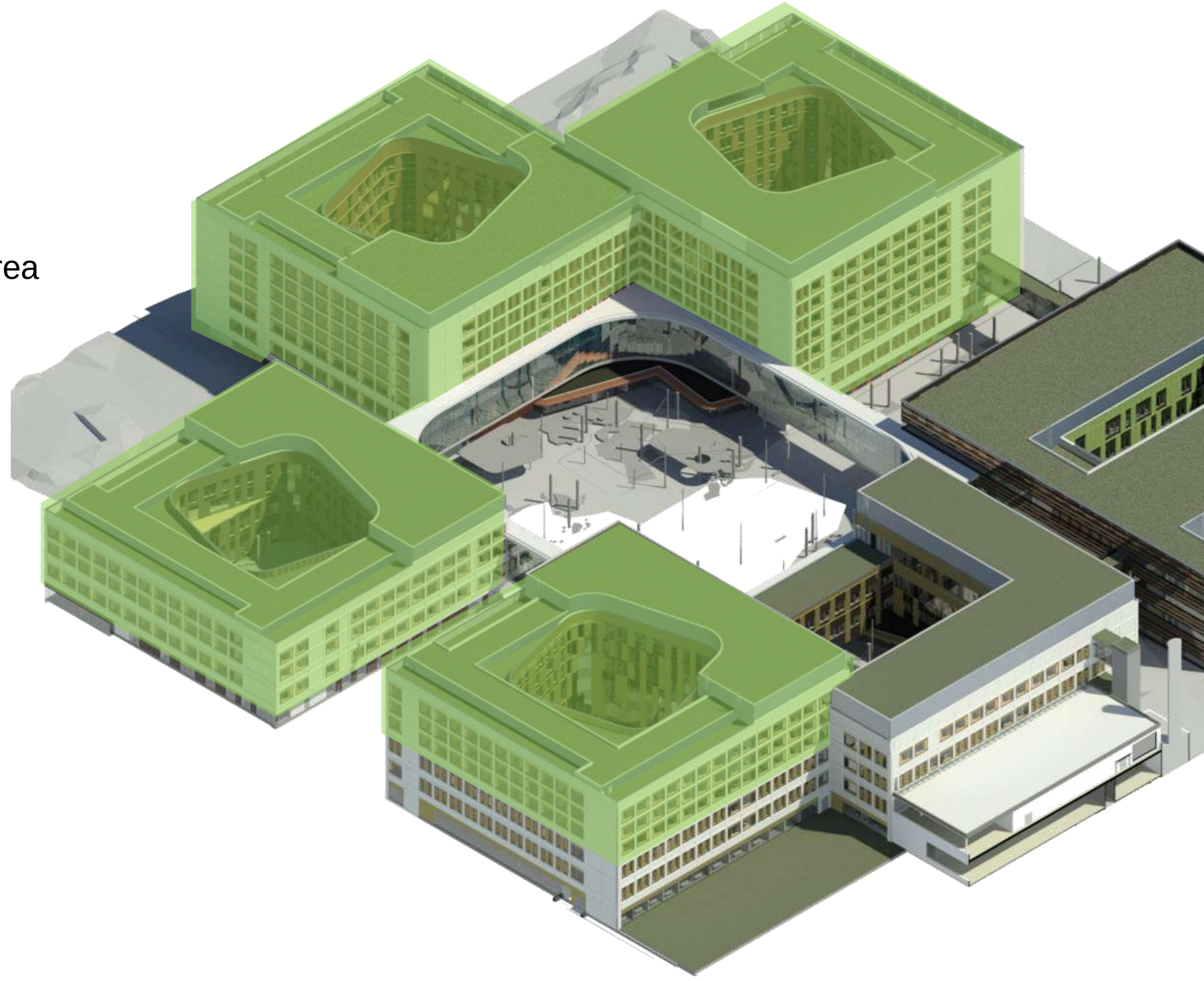


Bed wards approx. 40 % of total area

-> standardizing room modules
Standardized layout design
leads to obvious benefits for
planning and building …



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Section bed-ward building

Technical roof

Bed-wards

Bed-wards

Bed-wards

Bed-wards

Bed-wards

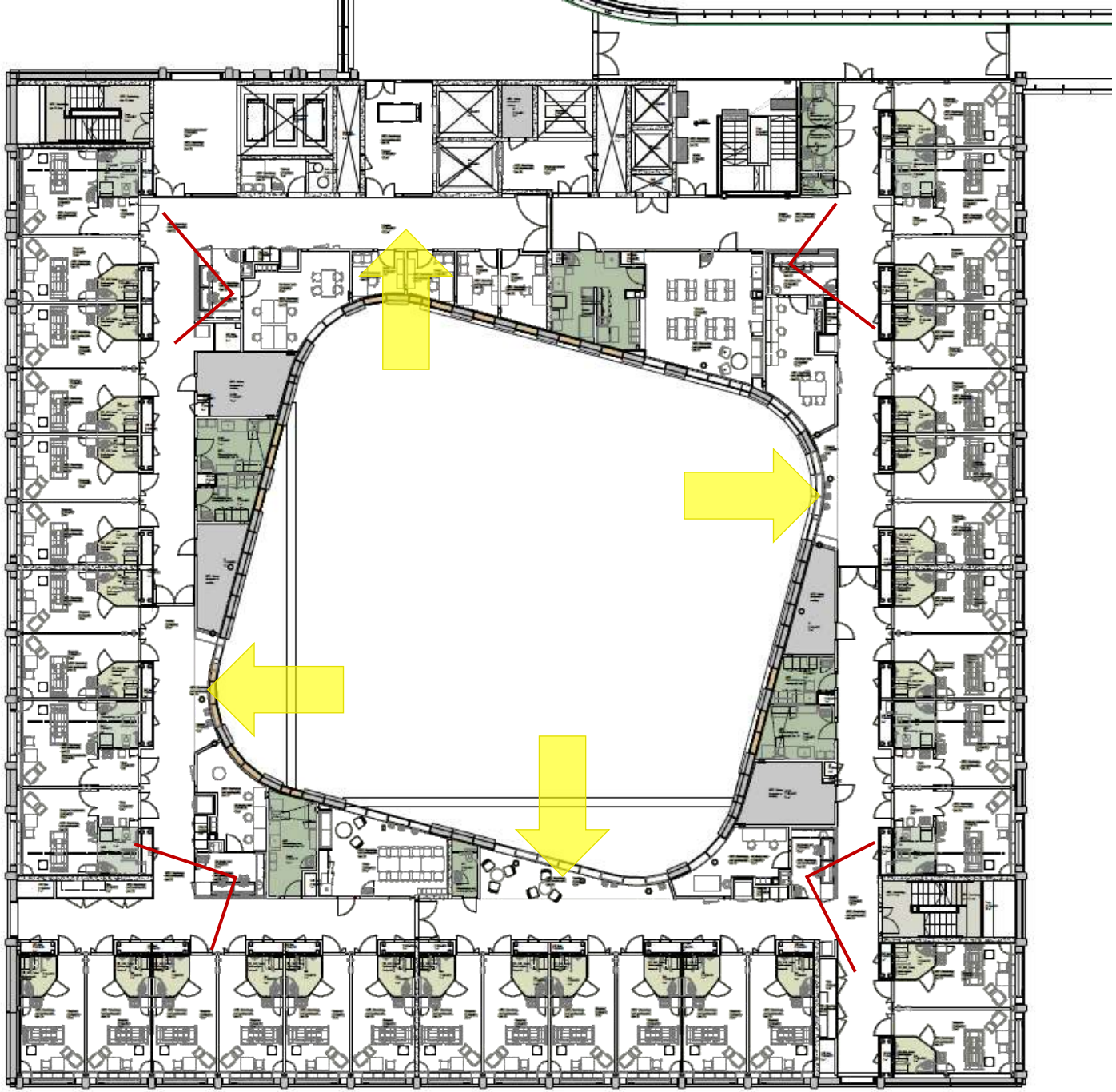
Treatment rooms / bed-wards

Treatment rooms / public area

Technics and logistics

Multiple vertical technical shafts to
reduce bedward floor heights to 3,6 m

STANDARD BED-WARD FLOOR



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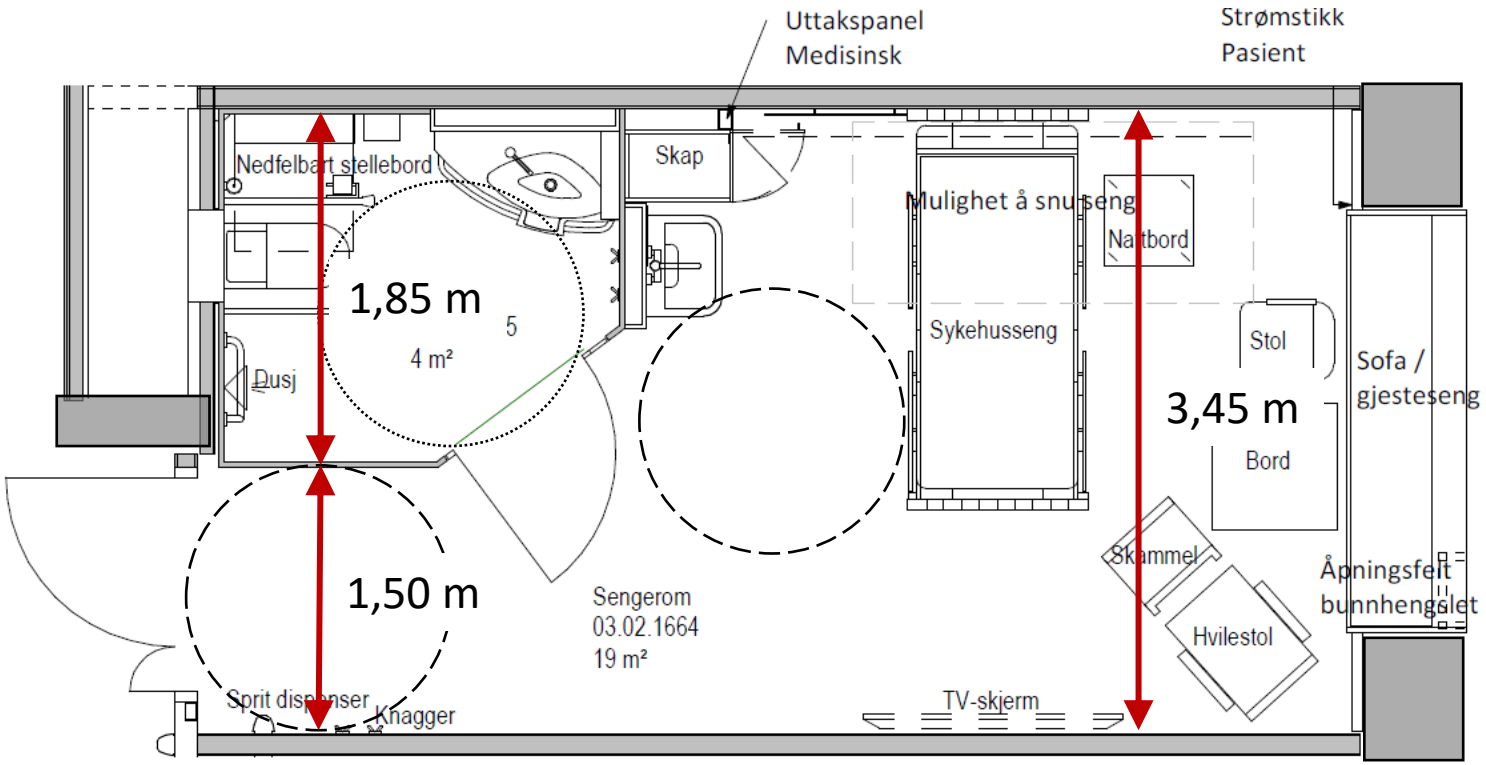

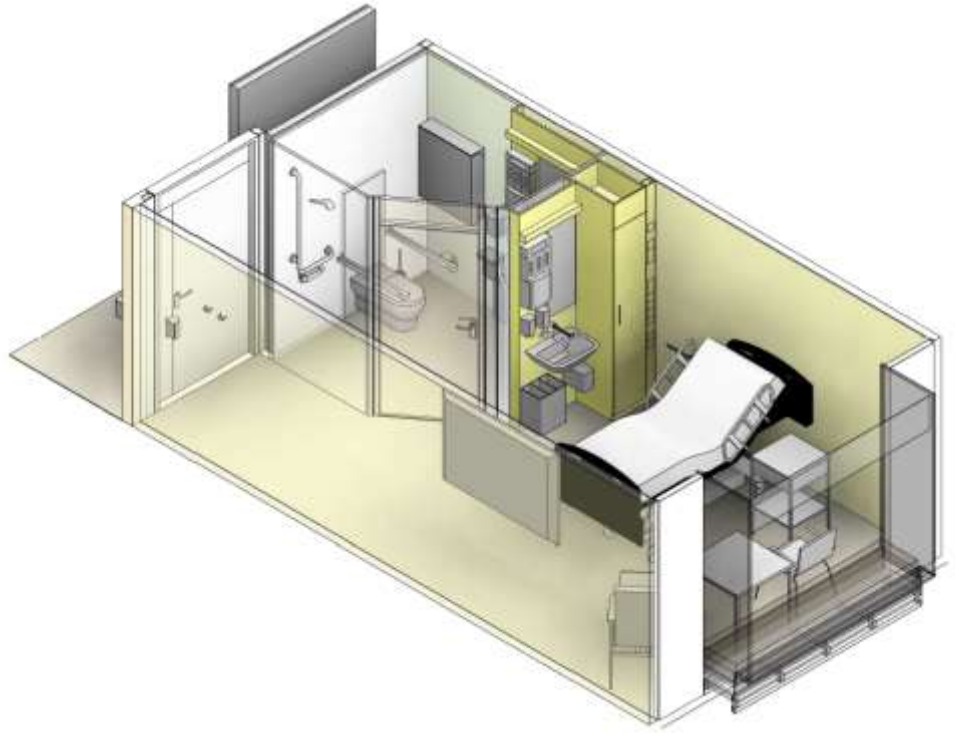

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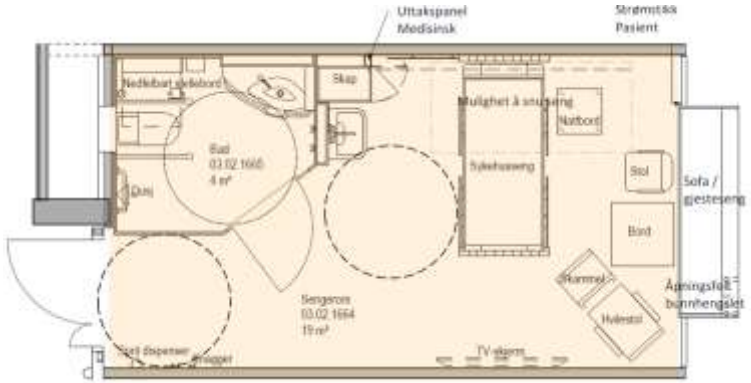
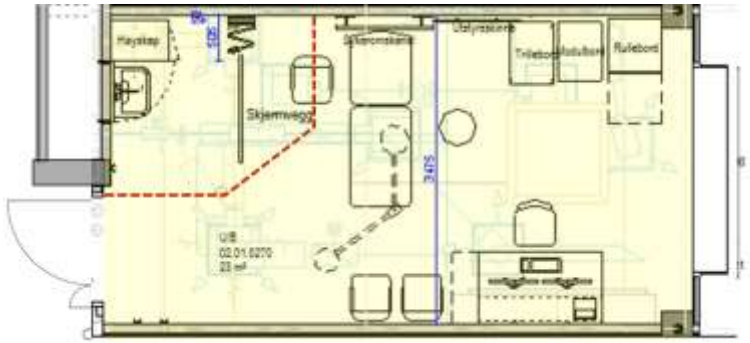
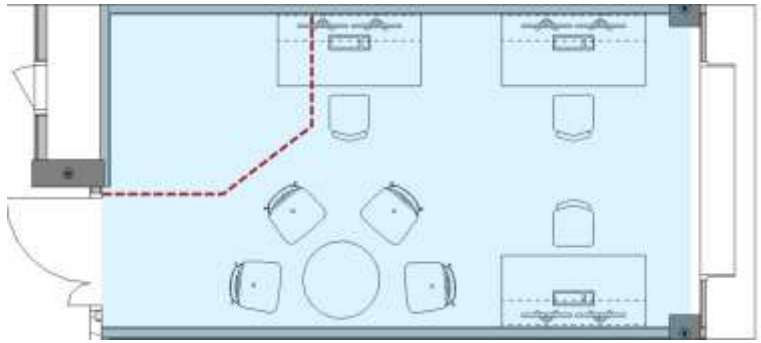
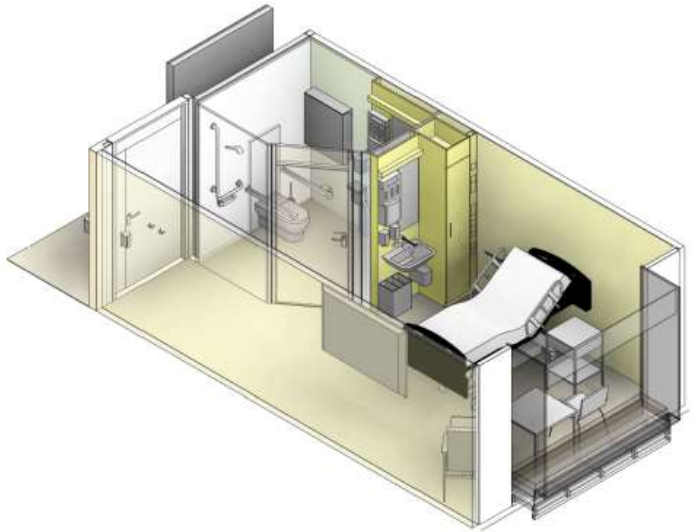
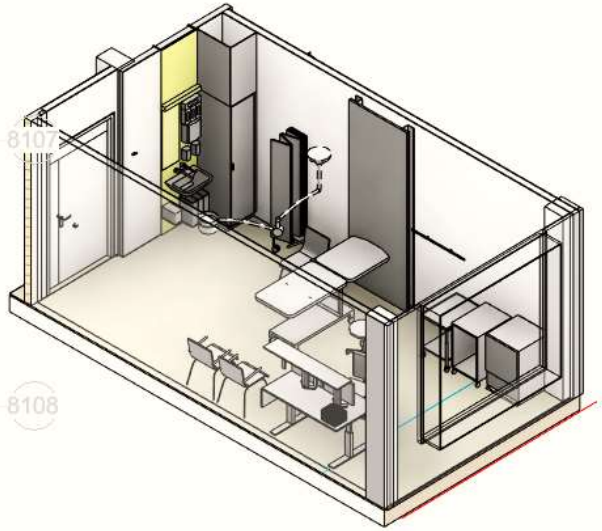
Standard SINGLE Bed Patient Room – minimized bathroom wall provides extra space











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Standard Patient Room as Flexible Room module –> treatment room –> Offices or More

STANDARDIZED LAYOUT DESIGN
DESIGN REPETITIONS

Standard Room	Building 81	Building 71	Building 21
Patient rooms	289	58	102
Workstatios (inner)	53	14	17
Workstations (outer)	55	14	18
Desinfection rooms	42	11	20
And more	……	……	……

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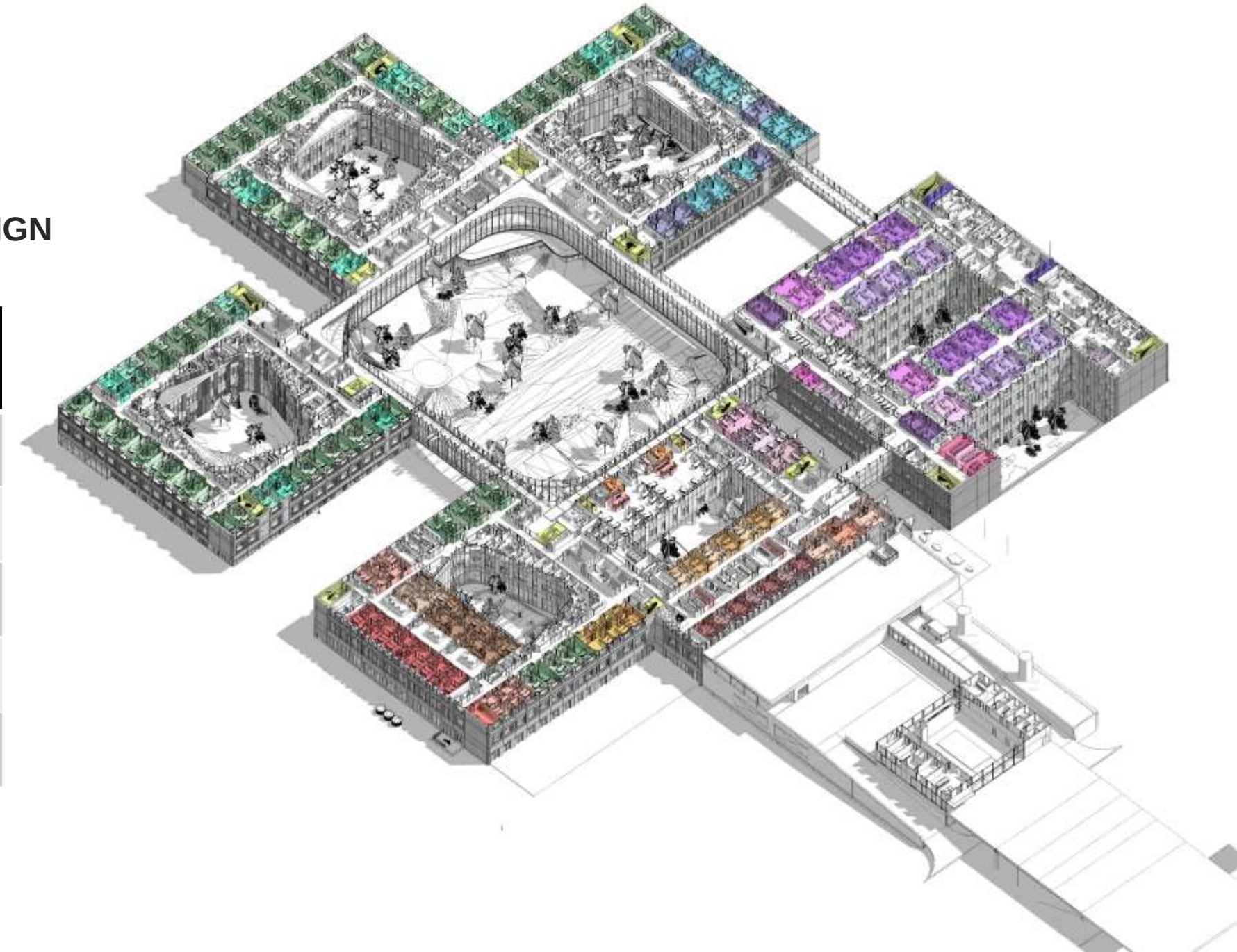
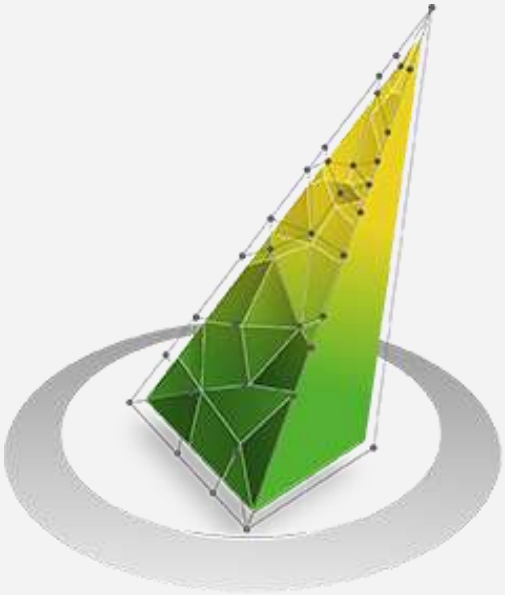


World Class in BIM?

AEC Excellence Awards 2018



AEC
Excellence
Awards
2018

Standardized Layout design

Developing modeling tools to handle changes with design repitions easily

Placeholder technology

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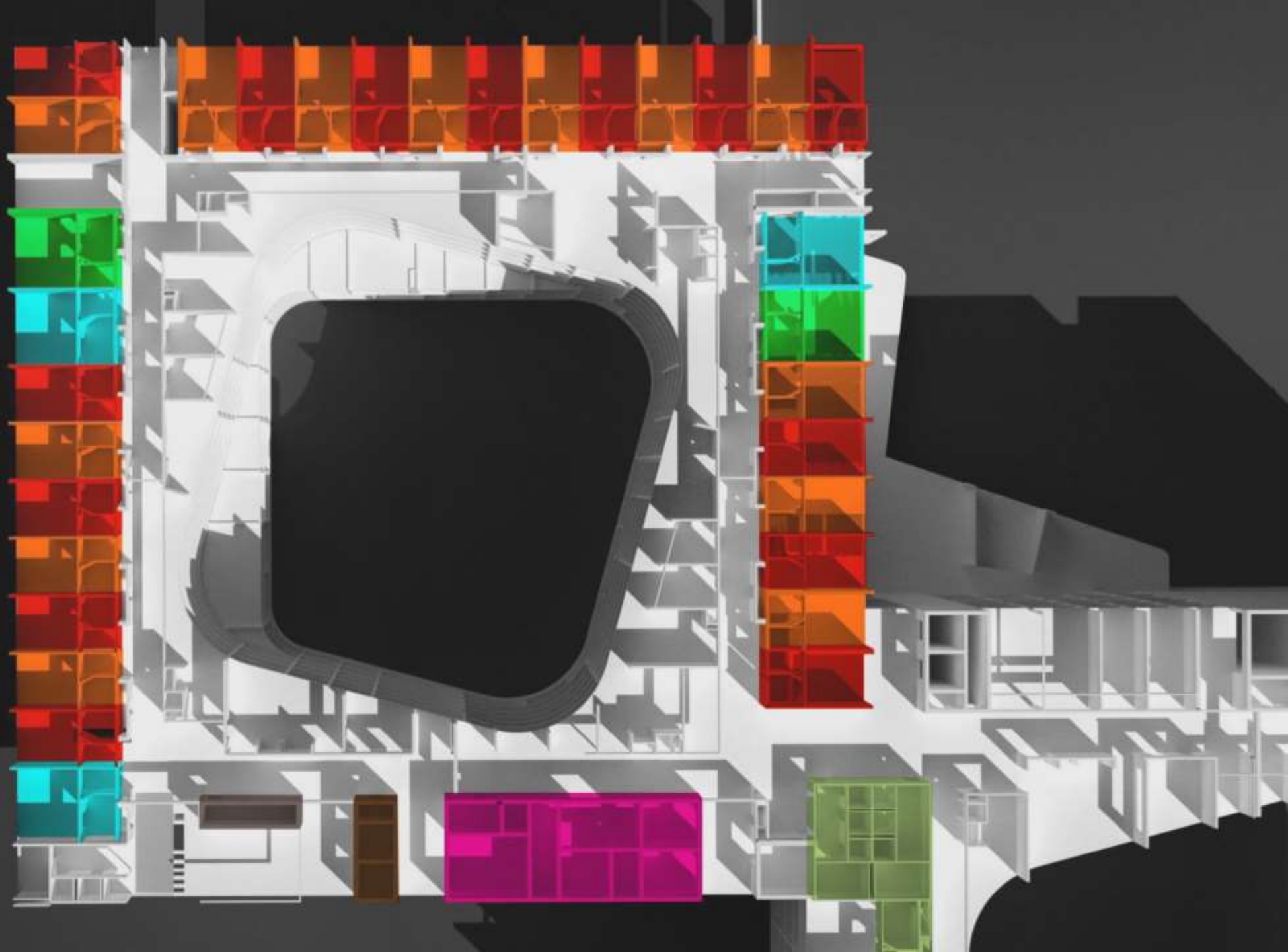

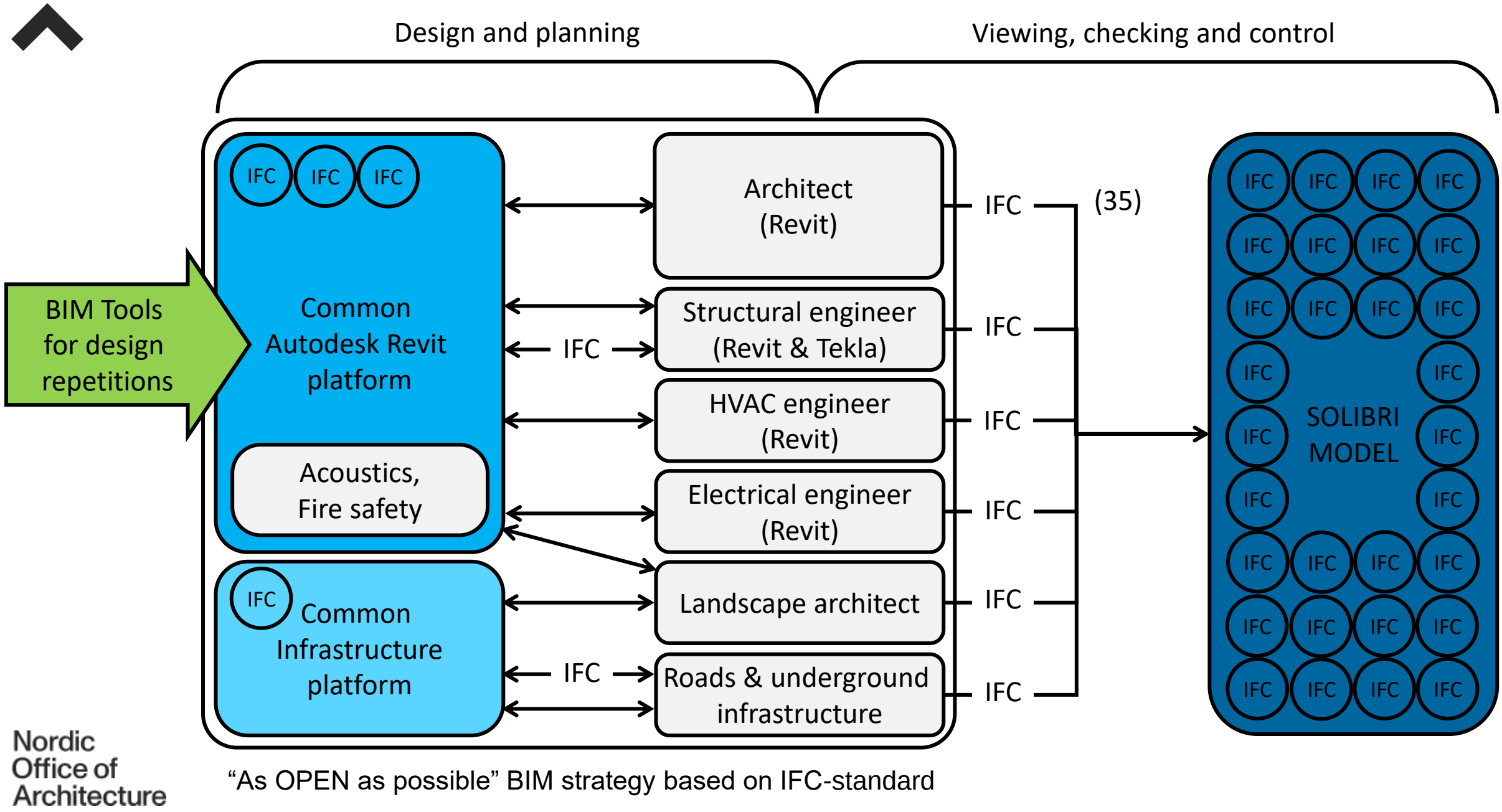

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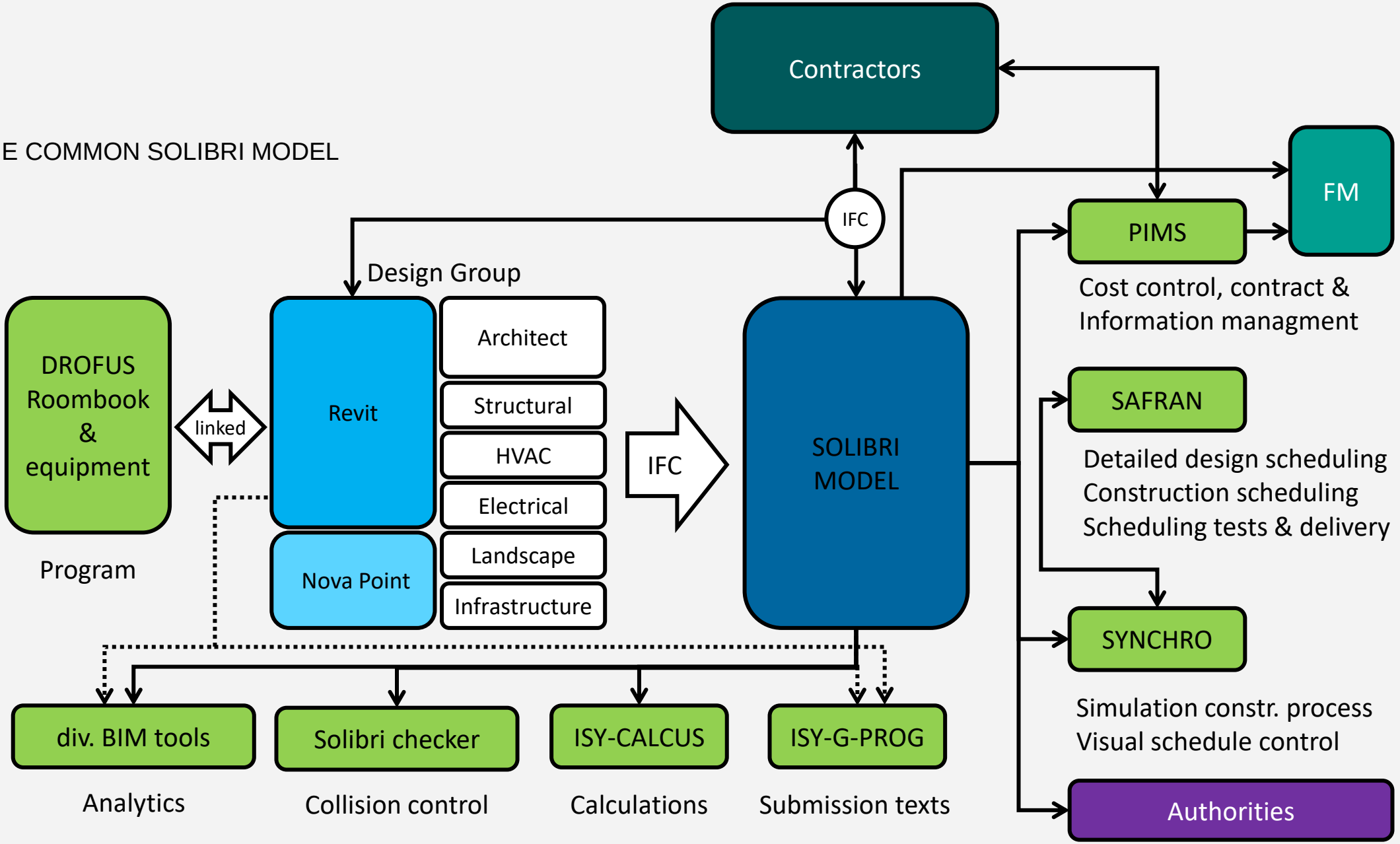
"As OPEN as possible" BIM strategy based on IFC-standard

WIDE USE OF THE COMMON SOLIBRI MODEL



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COMMON SOLIBRI MODEL

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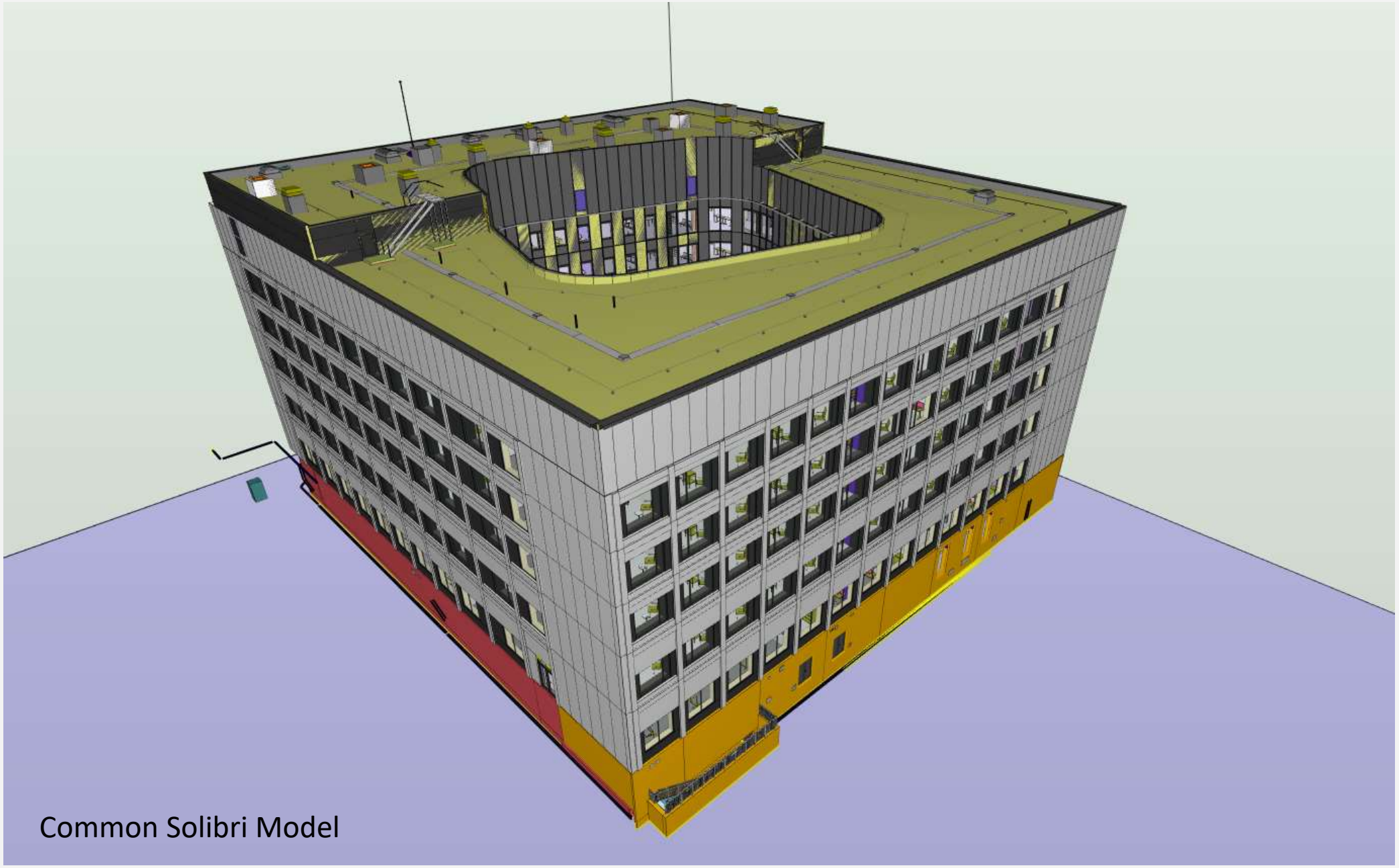

Common Solibri Model

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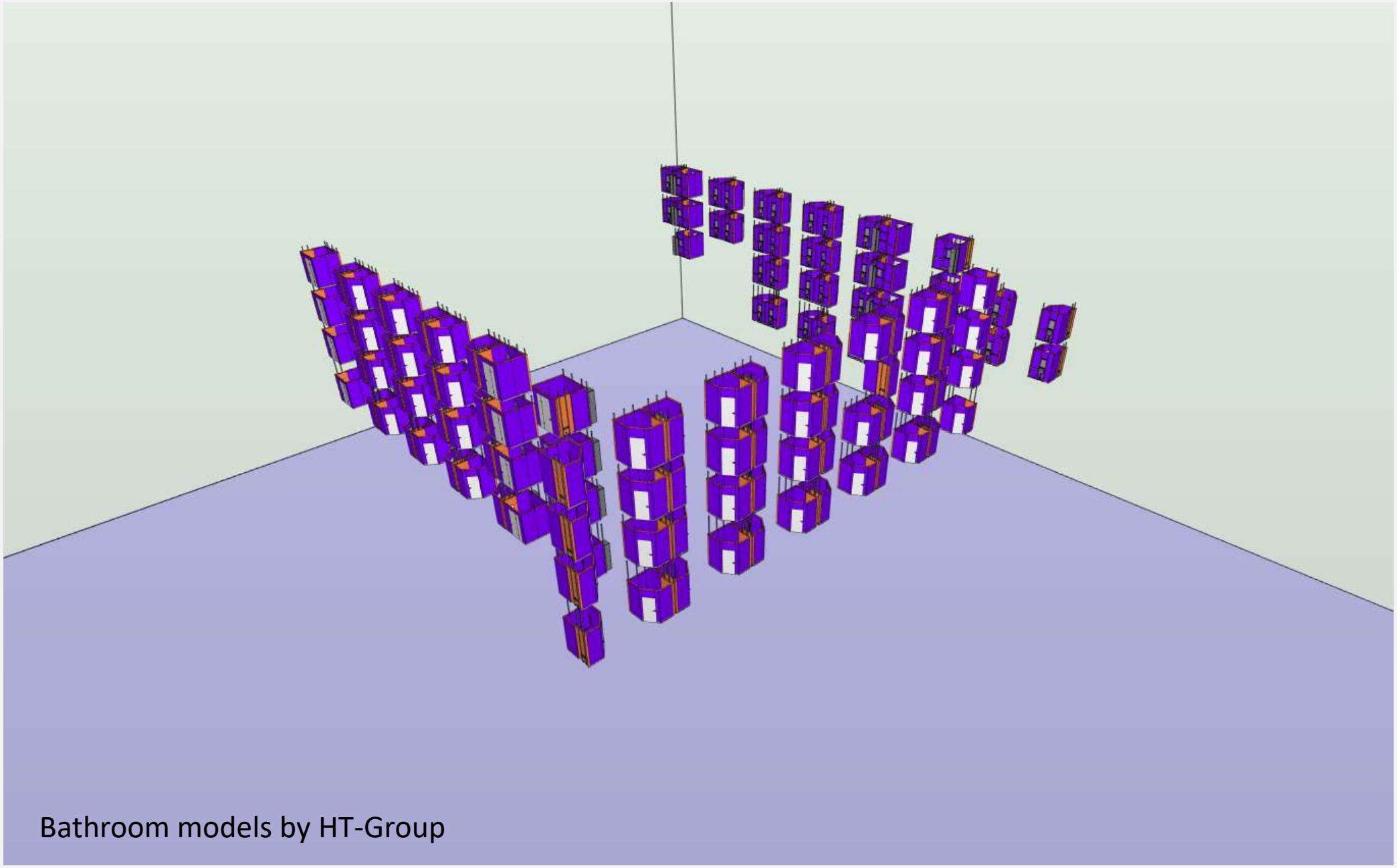

Bathroom models by HT-Group

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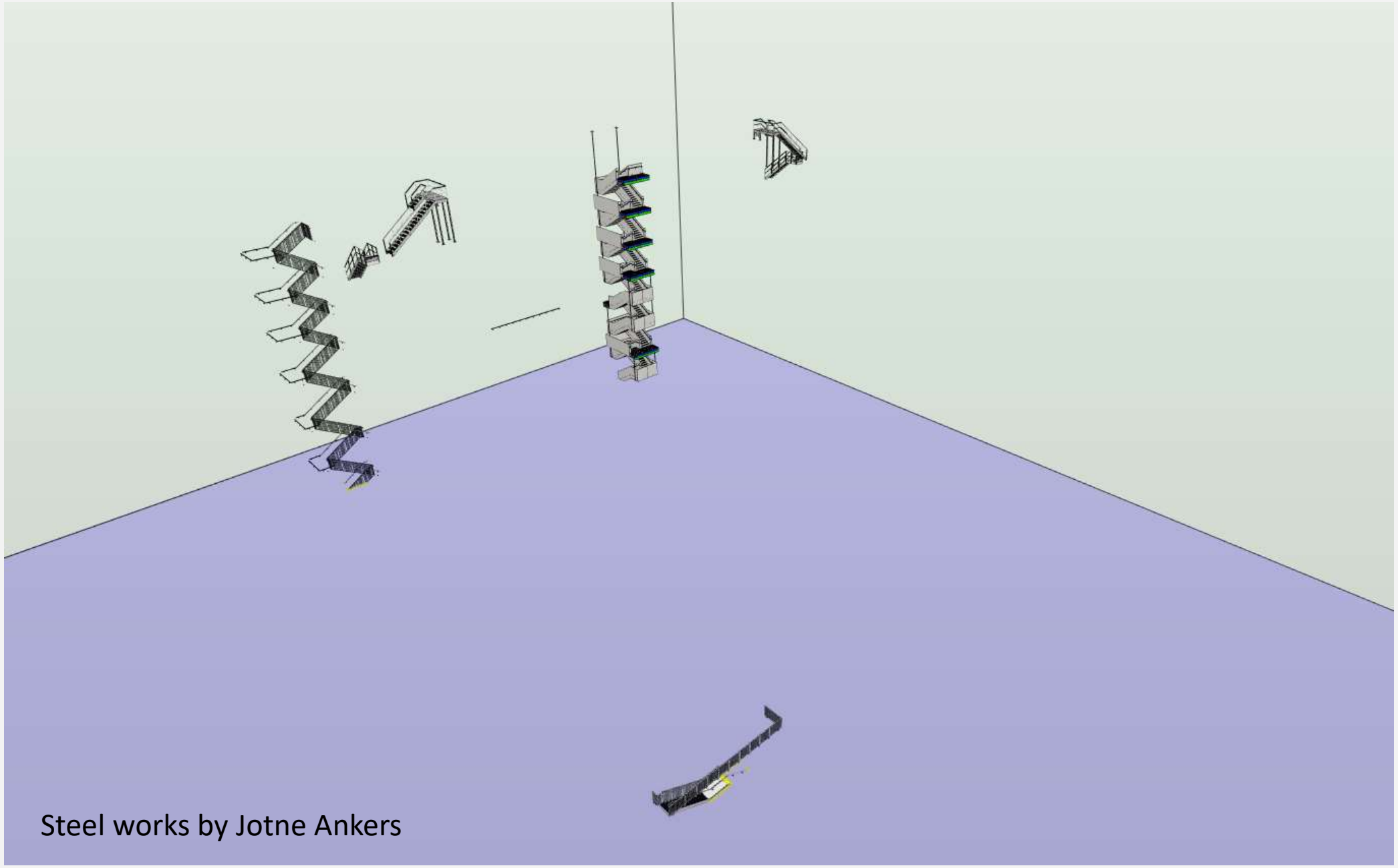

Steel works by Jotne Ankers

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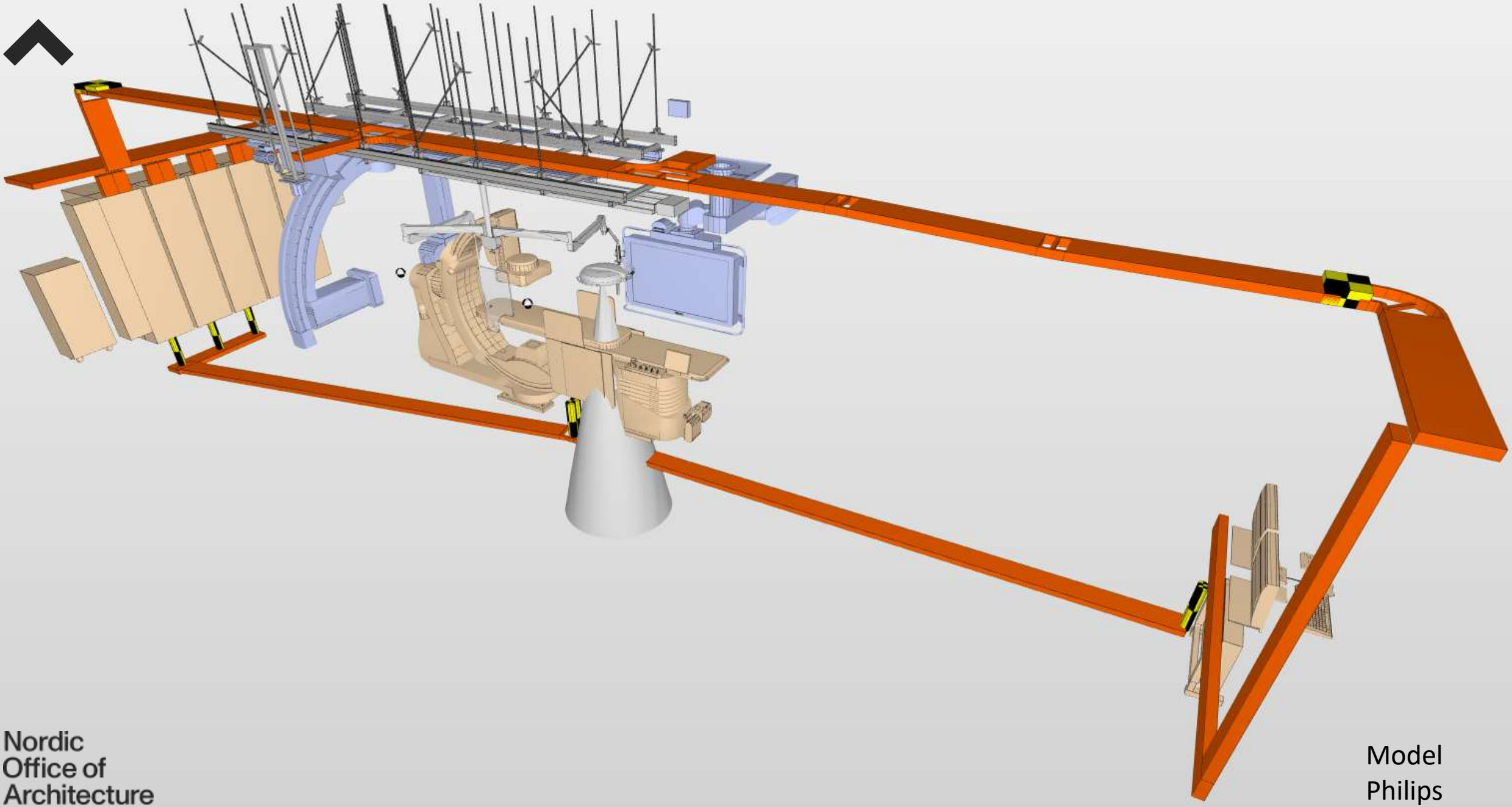

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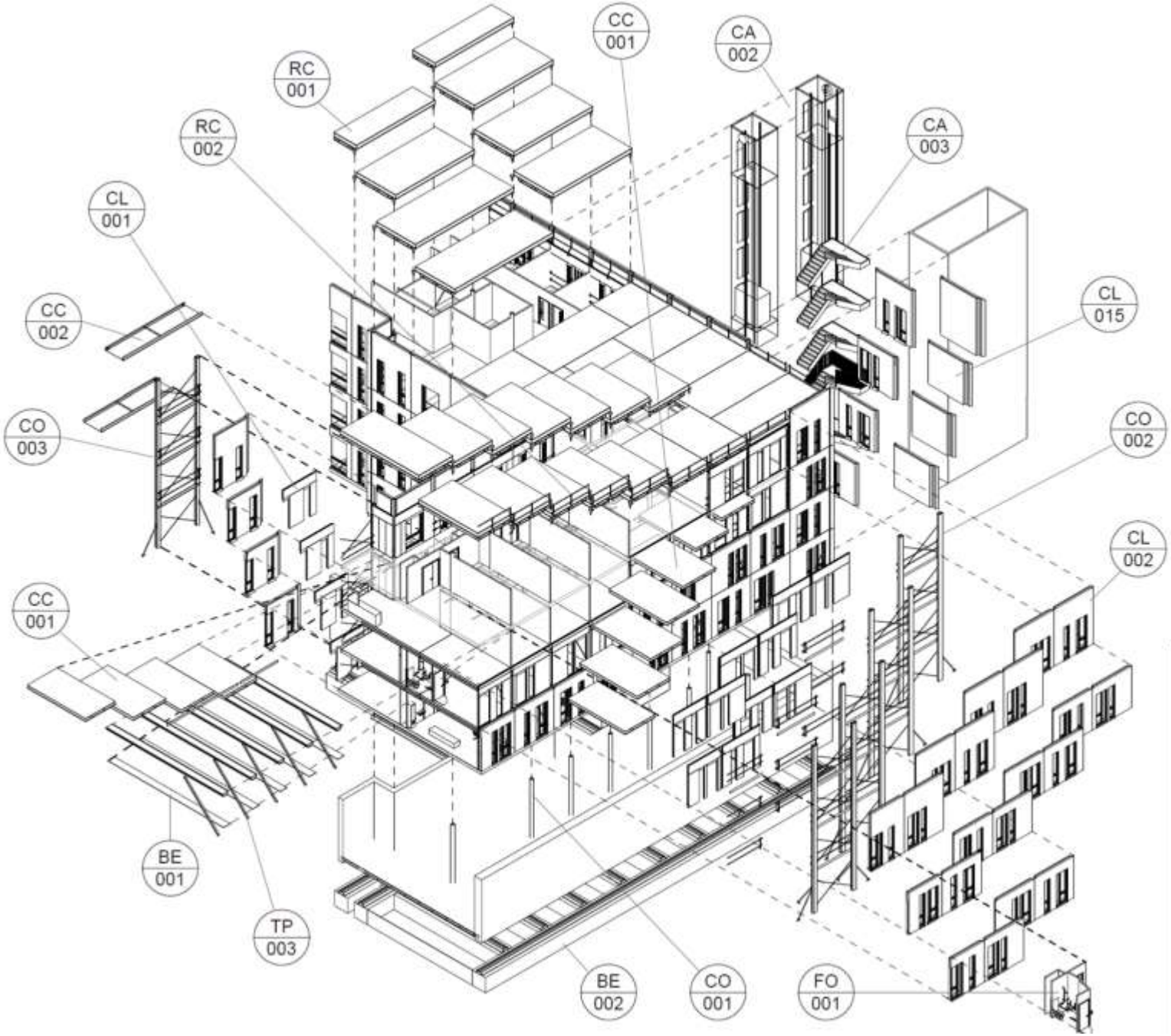
Model
Philips

Learning from the best

Opportunities for:

- Standardisation
- Industrial production
- Construction strategy
- Data strategy



Bryden Wood

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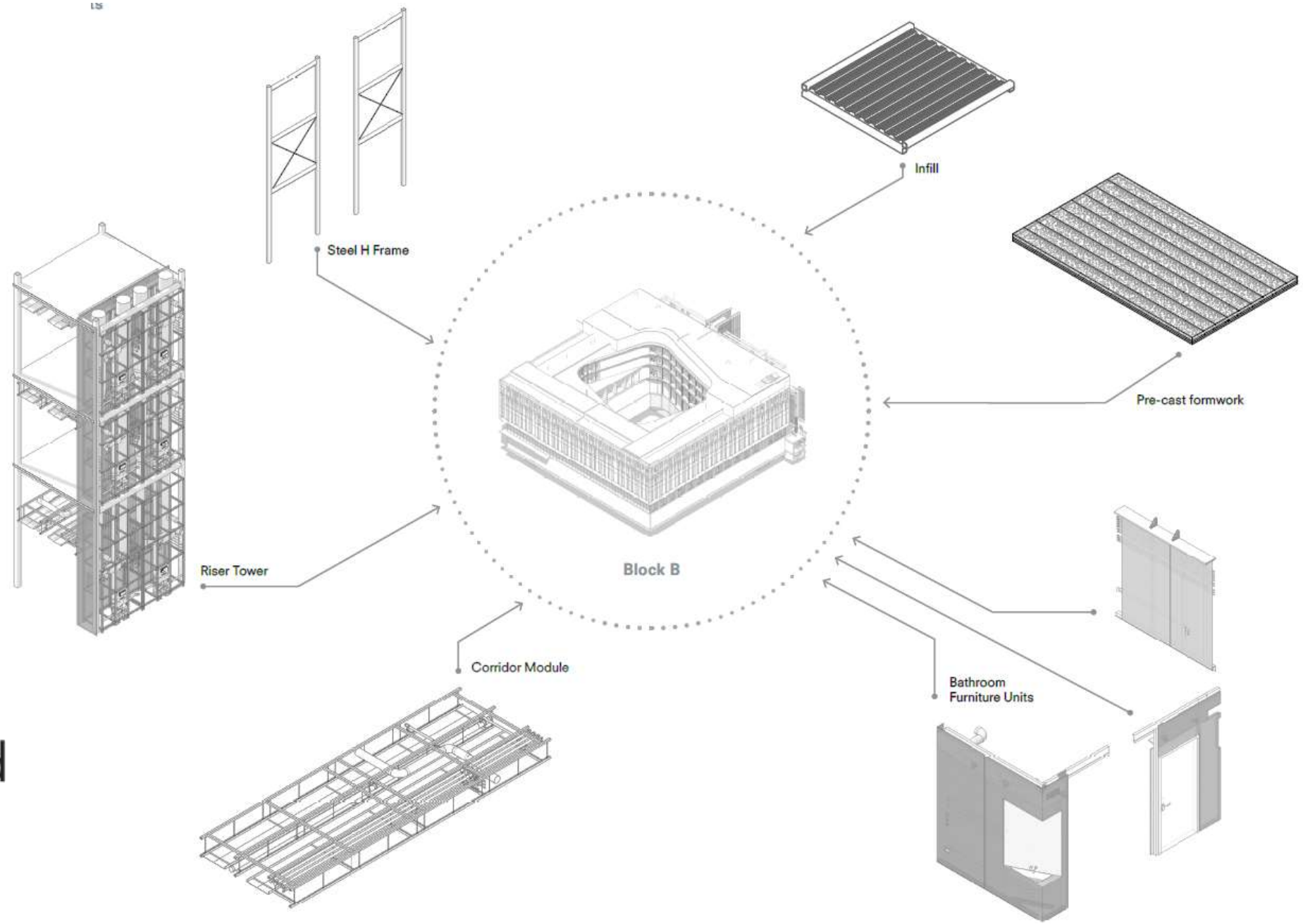
Learning from the best

Identifying building components for prefabrication



Bryden Wood

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DEVELOPING OUR STRATEGY

Identifying **components** for “industrialization”

Carcass and façade:

- Prefabricated steel reinforcement cages
- Slipform construction for concrete cores
- Prefabricated columns and beams
- Pre-cast stair-elements
- Pre-cast formwork slab elements
- Prefabricated façade elements

Interior finish and installations:

- “Stupid wall”-strategy
- Slab-integrated mounting rails on all floors
- Prefabricated vertical installation shafts
- Prefabricated “flat-packed” bathrooms
- Prefabricated sanitary units
- Built-in guest-beds in patient rooms
- Door-elements with installation canal
- Prefabricated operational theatres

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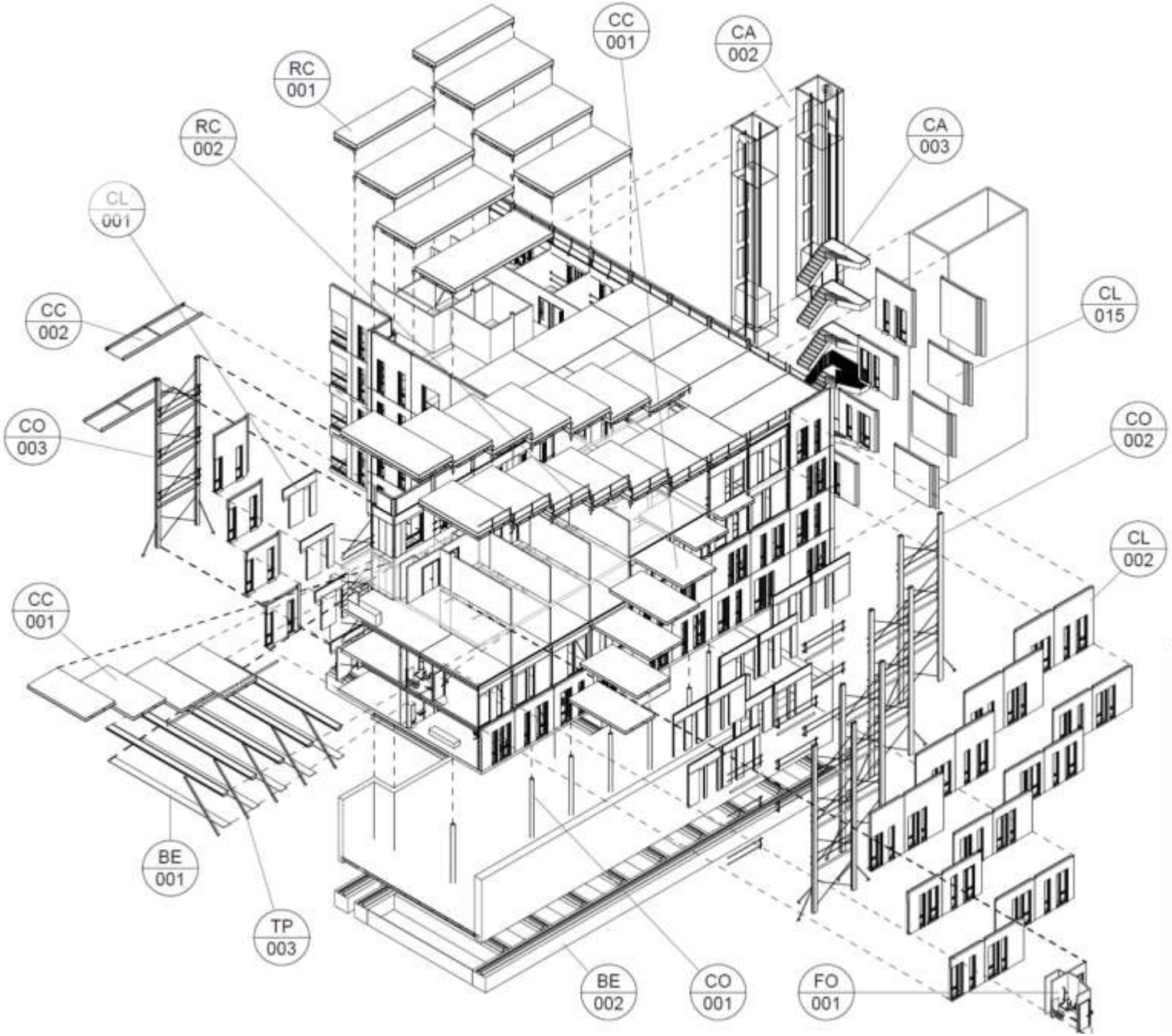

INDUSTRIAL DESIGN & PREFABRICATION

Carcass and façade:

- **Prefabricated steel reinforcement cages**
- Slipform construction for concrete cores
- Prefabricated columns and beams
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- Pre-cast formwork slab elements
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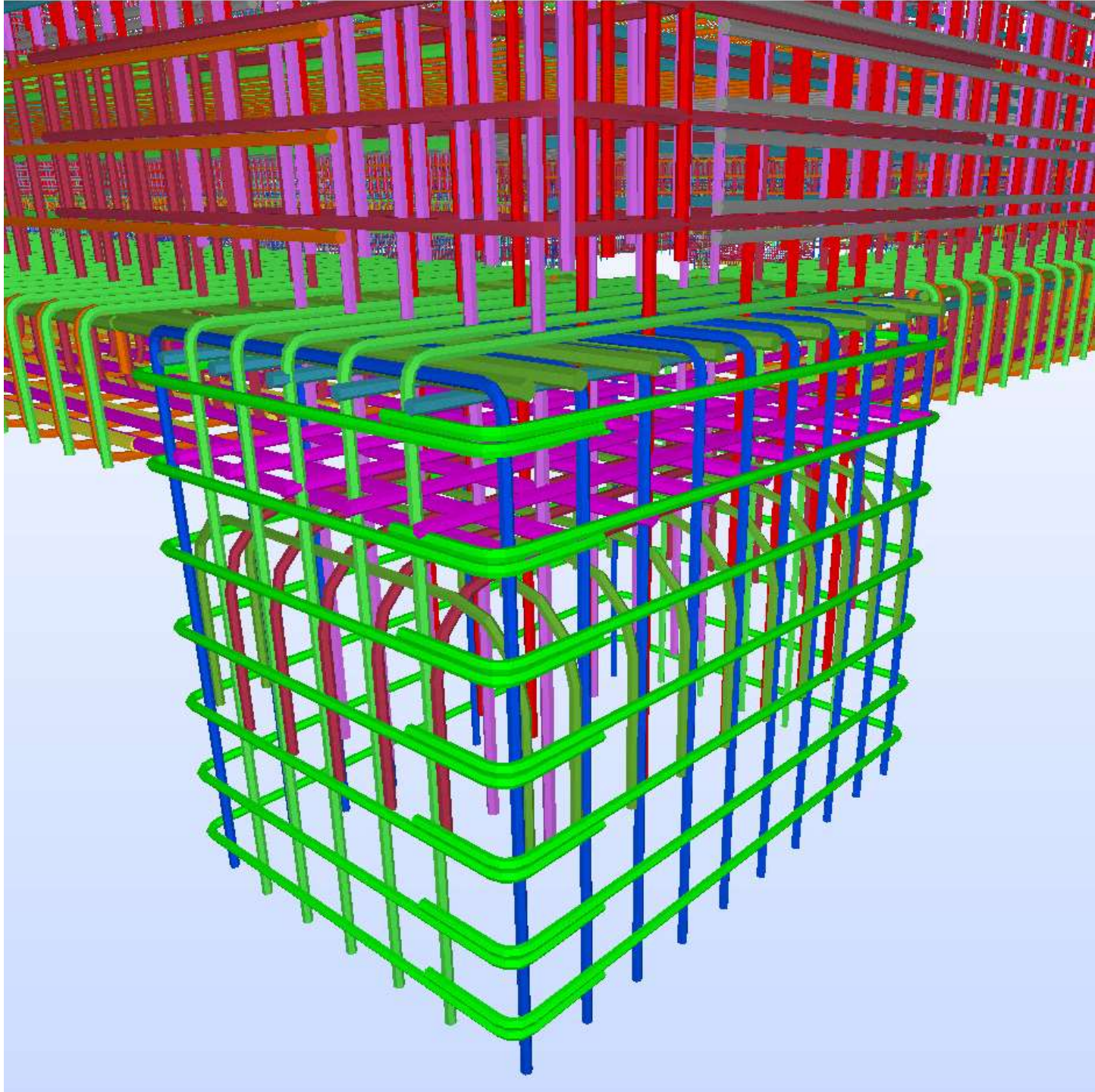

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INDUSTRIAL DESIGN & PREFABRICATION

Carcass and façade:

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POP UP Concrete prefabrication factory – on site

INDUSTRIAL DESIGN & PREFABRICATION

Carcass and façade:

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- Prefabricated columns and beams
- Pre-cast stair-elements
- **Pre-cast formwork slab elements**
- Prefabricated façade elements

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INDUSTRIAL DESIGN & PREFABRICATION

Carcass and façade:

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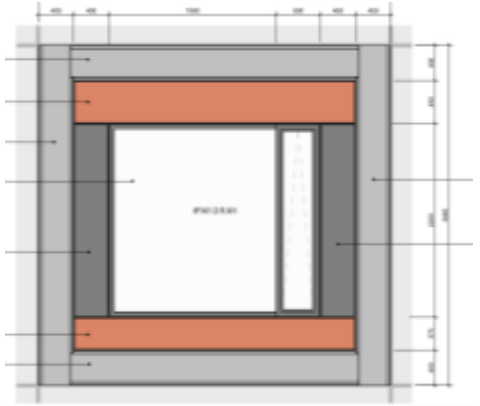
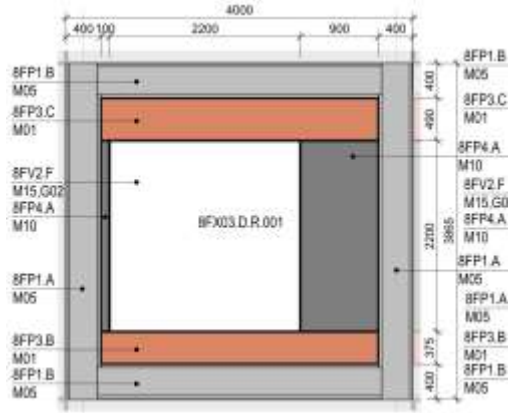
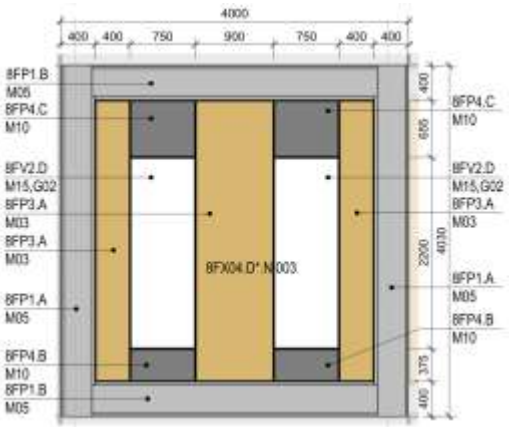
- **Prefabricated façade elements**







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Facade element production off-site

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5000 FACADE MODULES MOUNTED IN TOTAL - 24 PER DAY IN AVERAGE

INDUSTRIAL DESIGN & PREFABRICATION

Interior finish and installations:

- **“Stupid wall”-strategy**
- Slab-integrated mounting rails on all floors
- Prefabricated vertical installation shafts
- Prefabricated “flat-packed” bathrooms
- Prefabricated sanitary units
- Built-in guest-beds in patient rooms
- Door-elements with installation canal
- Prefabricated operational theatres

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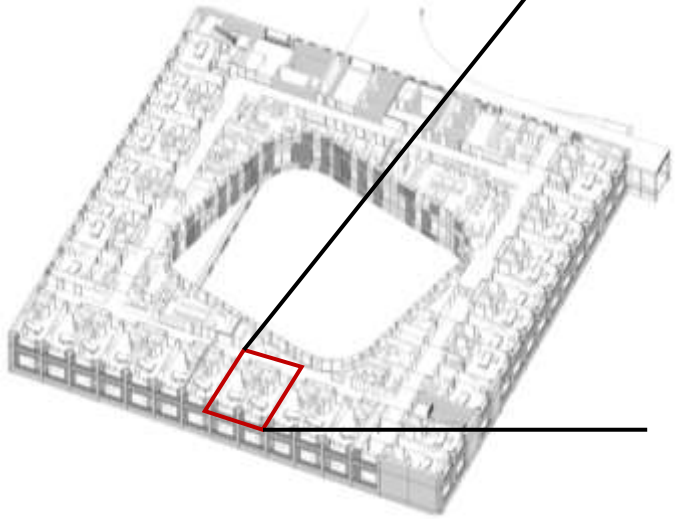

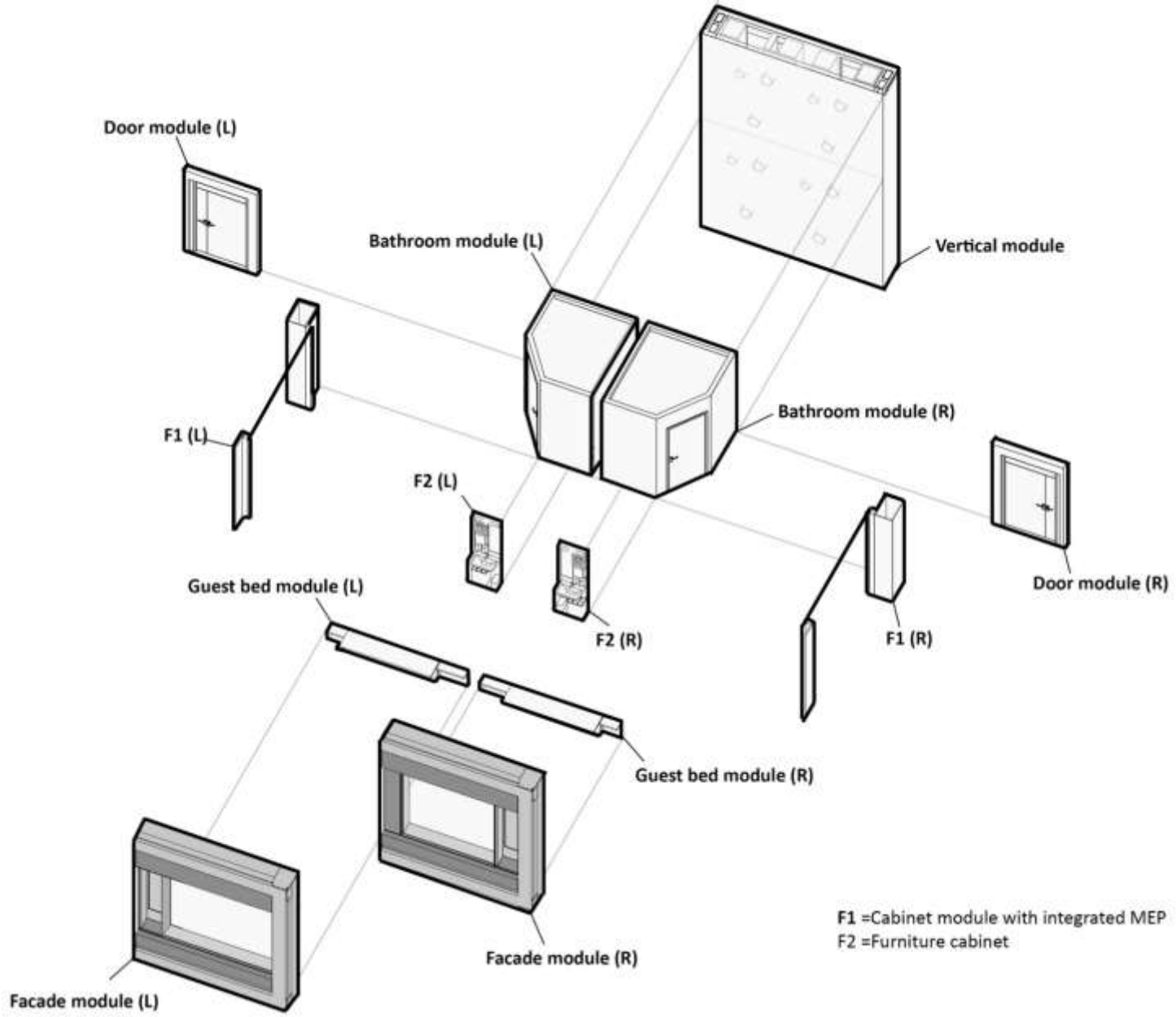

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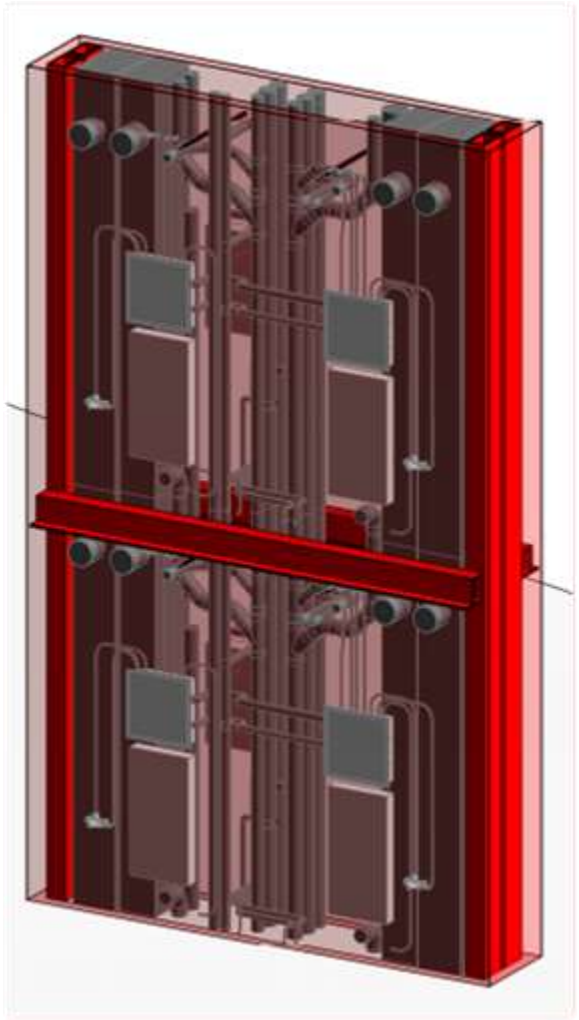

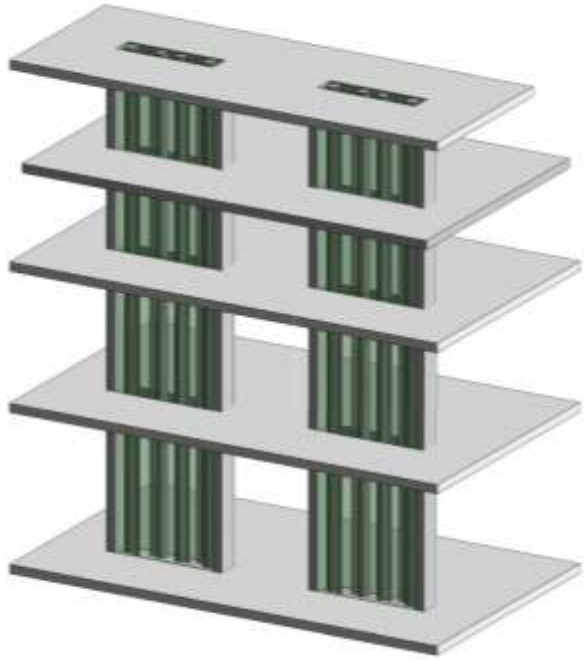

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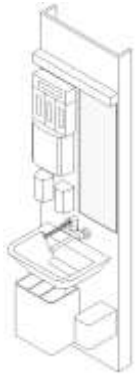
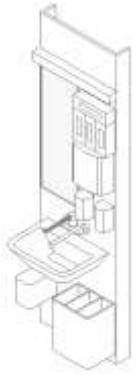
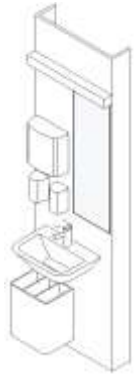
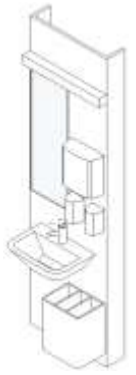
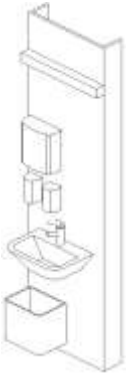
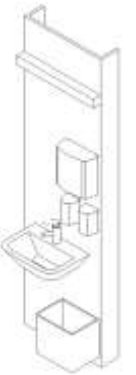
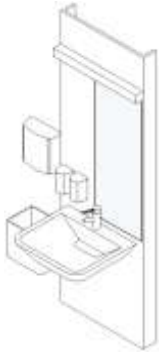
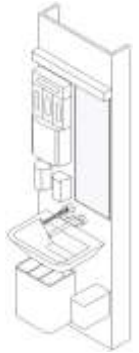
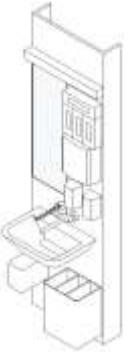
					
8S01.A.L.001 Vanity Unit Module 01_ Patient Care_H=2400mm_Left	**8S01.A.R.001** Vanity Unit Module 01_ Patient Care_H=2400mm_Right	**8S02.A.L.001** Vanity Unit Module 02_ Administrative Area, WC_H=2400mm_Left	**8S02.A.R.001** Vanity Unit Module 02_ Administrative Area, WC_H=2400mm_Right	**8S03.A.L.001** Vanity Unit Module 03_ Operational Area_H=2400mm_Left	**8S03.A.R.001** Vanity Unit Module 03_ Operational Area_H=2400mm_Right
					
8S04.A.L.001 Vanity Unit Module 04_Bathroom_H=2400mm_Left	**8S04.A.R.001** Vanity Unit Module 04_Bathroom_H=2400mm_Right	**8S05.A.L.001** Vanity Unit Module 05_HCWC_H=2400mm_Left	**8S05.A.R.001** Vanity Unit Module 05_HCWC_H=2400mm_Right	**8S06.A.L.001** Vanity Unit Module 06_ Patient Care with Manifold Cabinet_H=2400mm_Left	**8S06.A.R.001** Vanity Unit Module 06_ Patient Care with Manifold Cabinet_H=2400mm_Right

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2400 pieces in different variants

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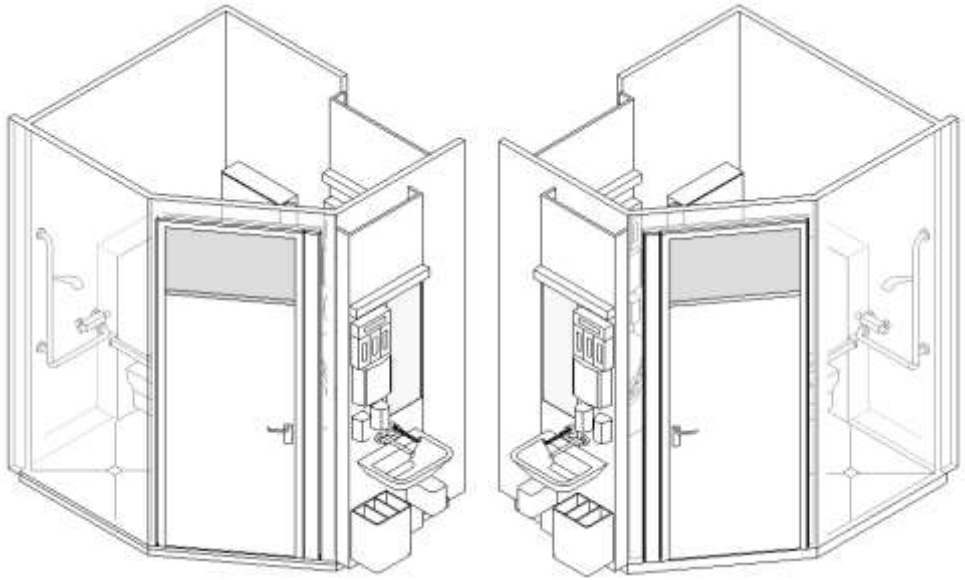

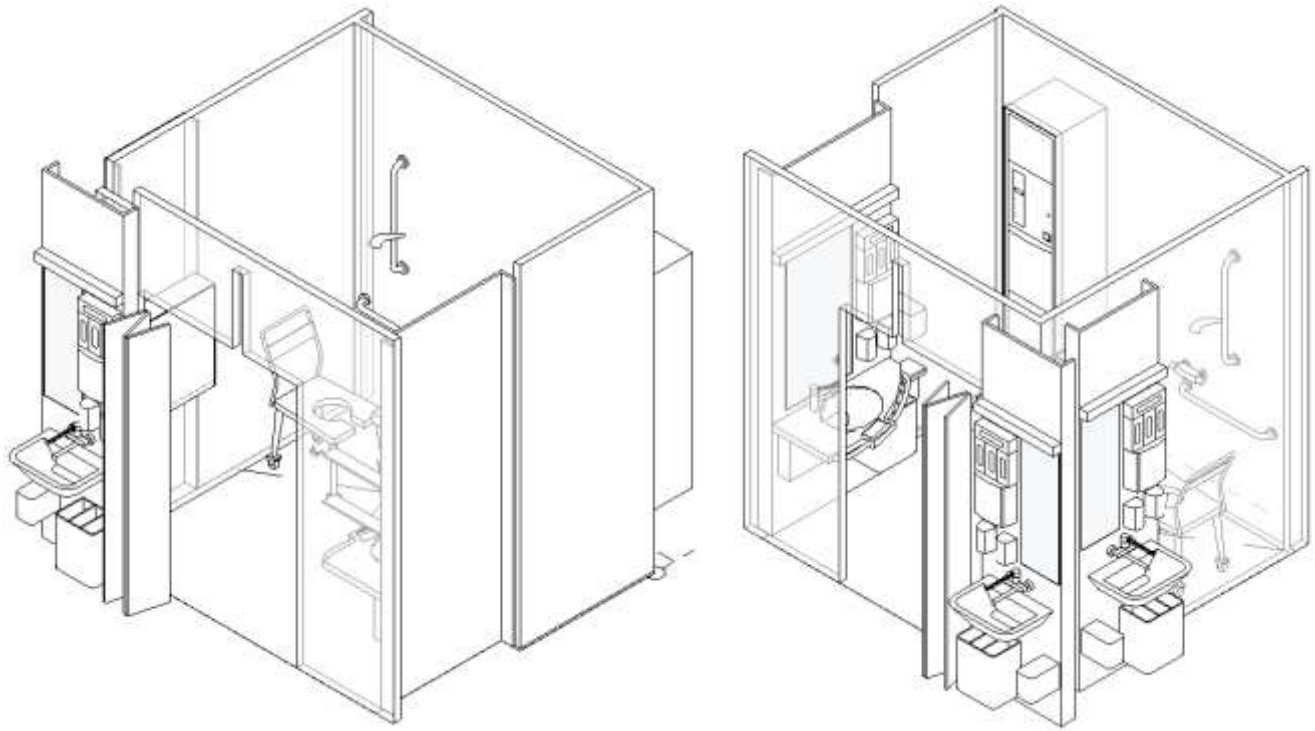

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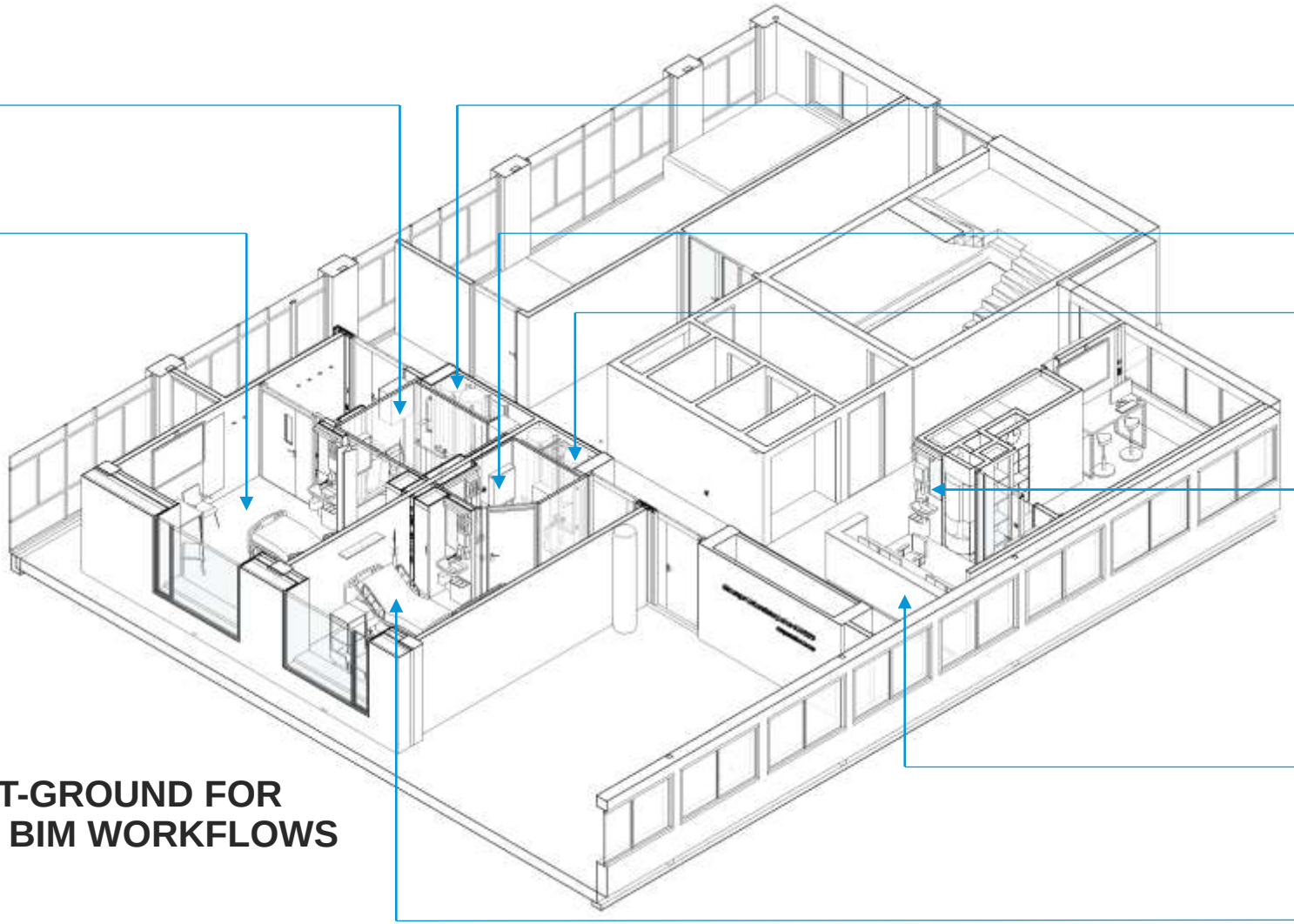

THE MOCKUP - A TEST-GROUND FOR BOTH MODULES AND BIM WORKFLOWS

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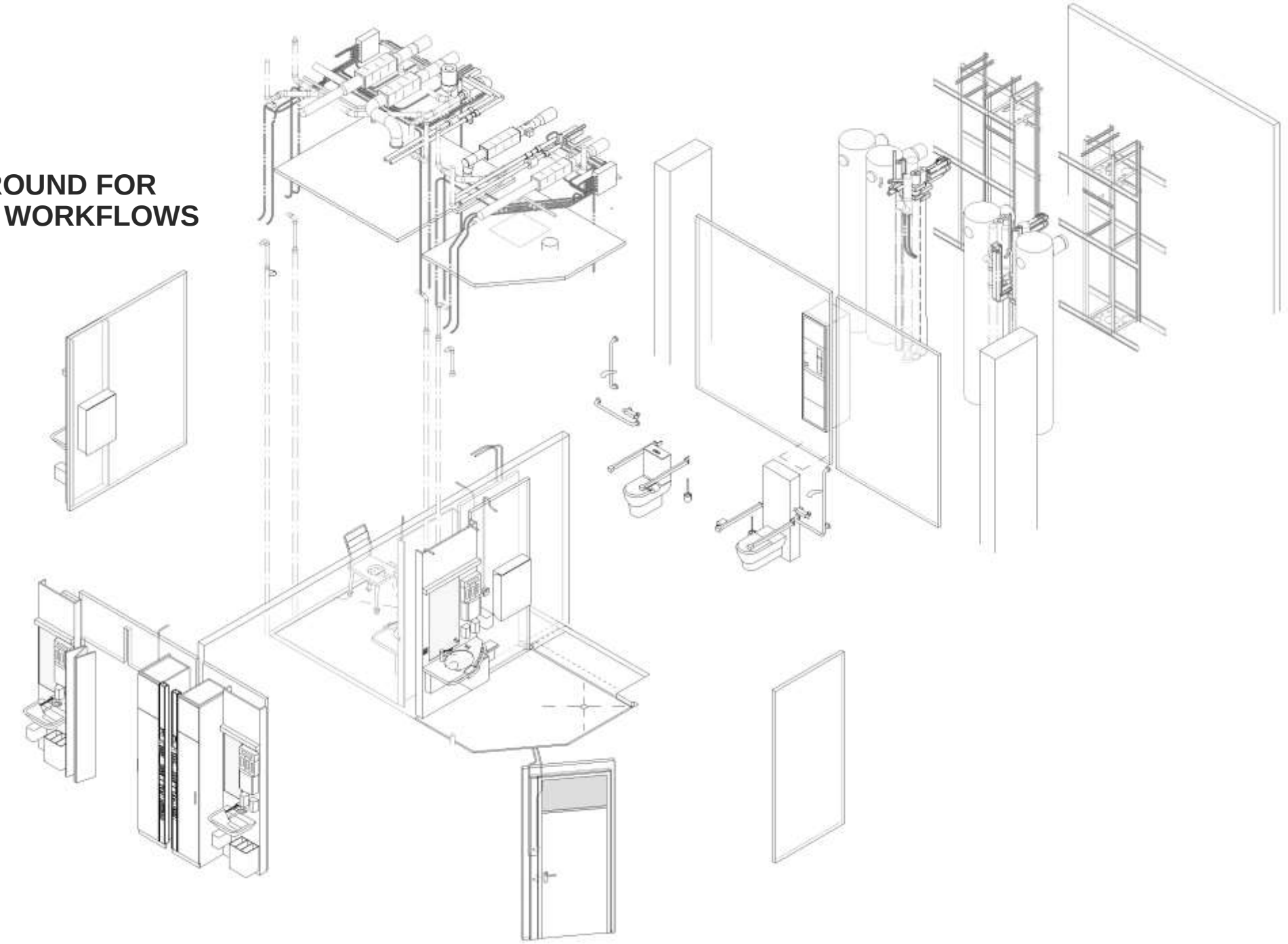

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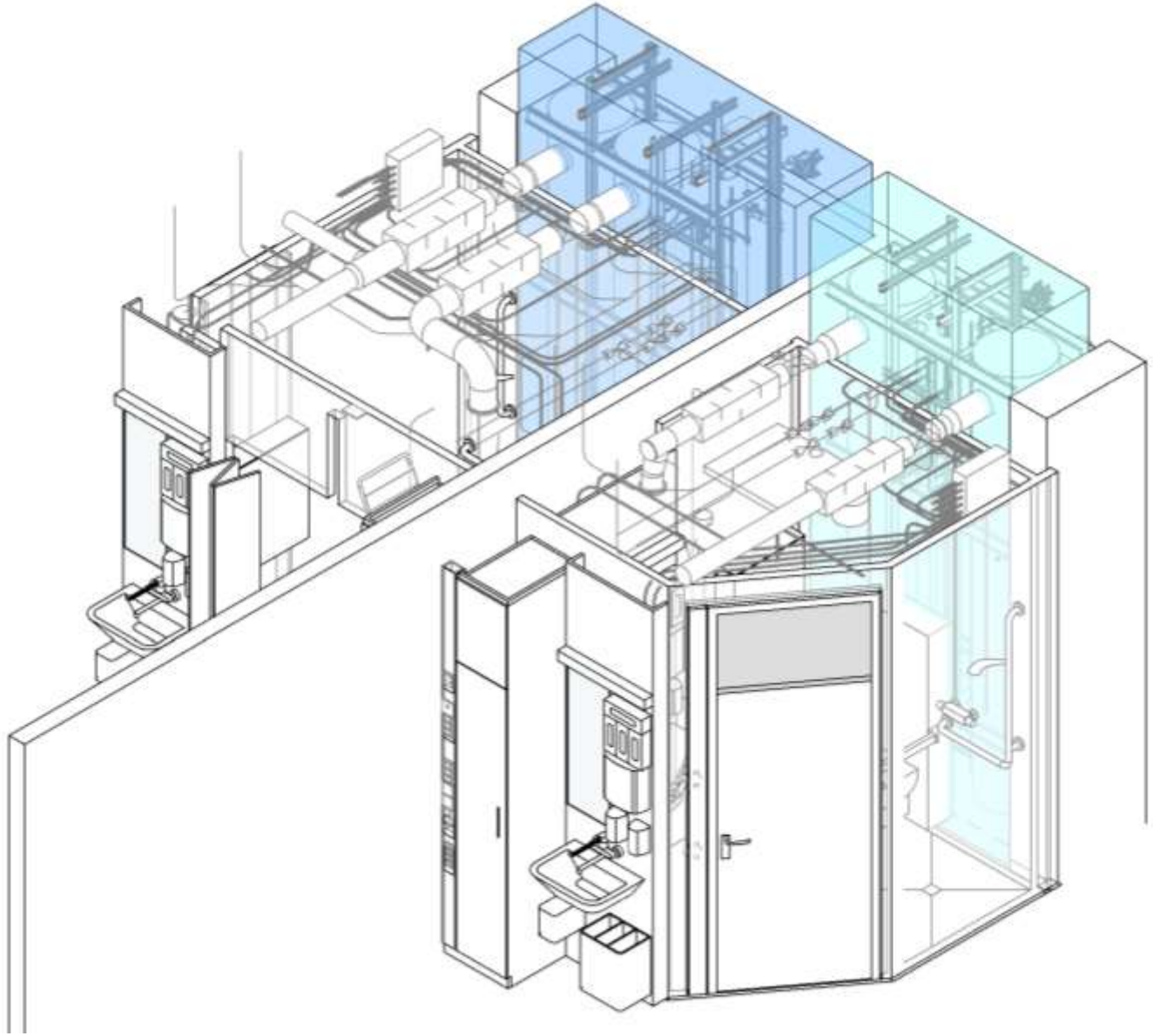

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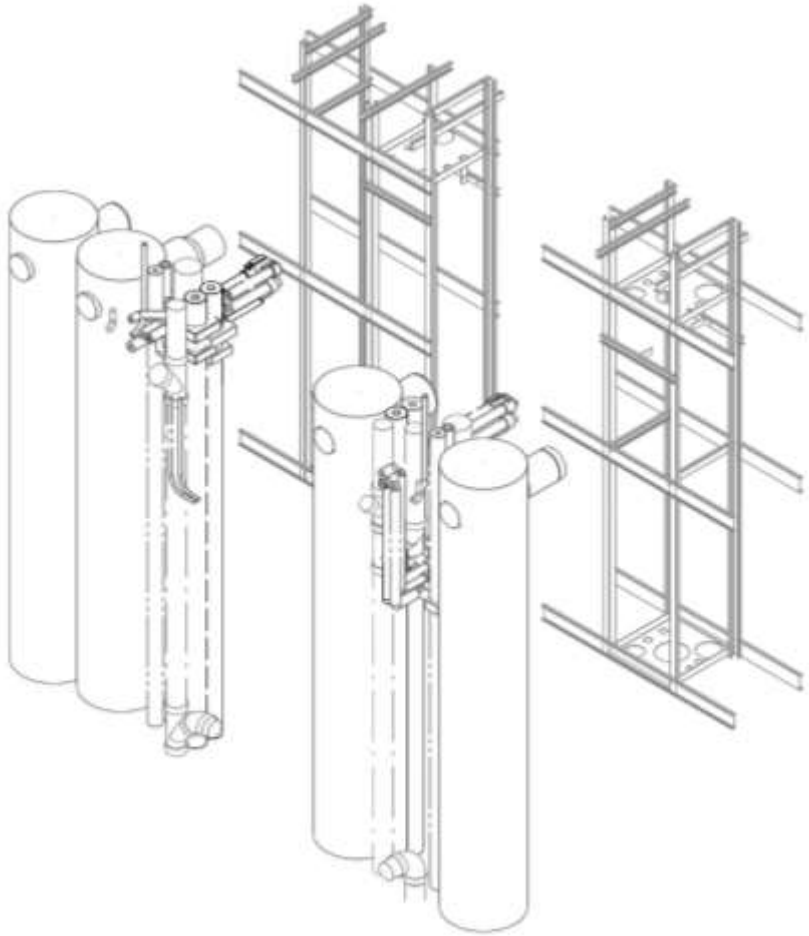
FROM MODEL TO PRODUCT – SHAFT MODULES IN THE MOCKUP MODEL



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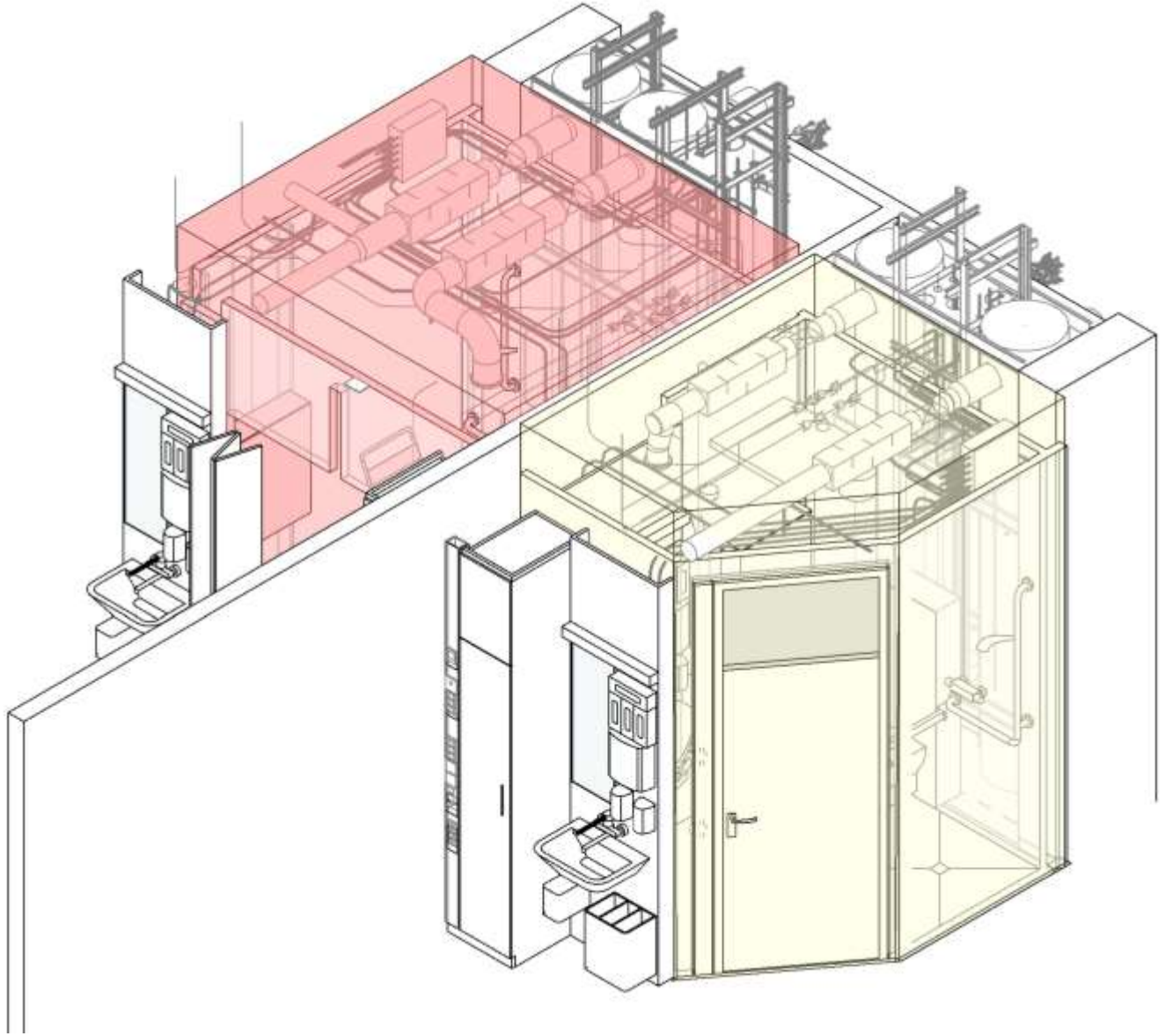
FROM MODEL TO PRODUCT – SHAFT MODULES IN THE MOCKUP MODEL AND ON SITE



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FROM MODEL TO PRODUCT – BATHROOM MODULES IN THE MOCKUP MODEL

Photo credit goes here




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FROM MODEL TO PRODUCT – BATHROOM MODULES IN THE MOCKUP MODEL


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SVILAND

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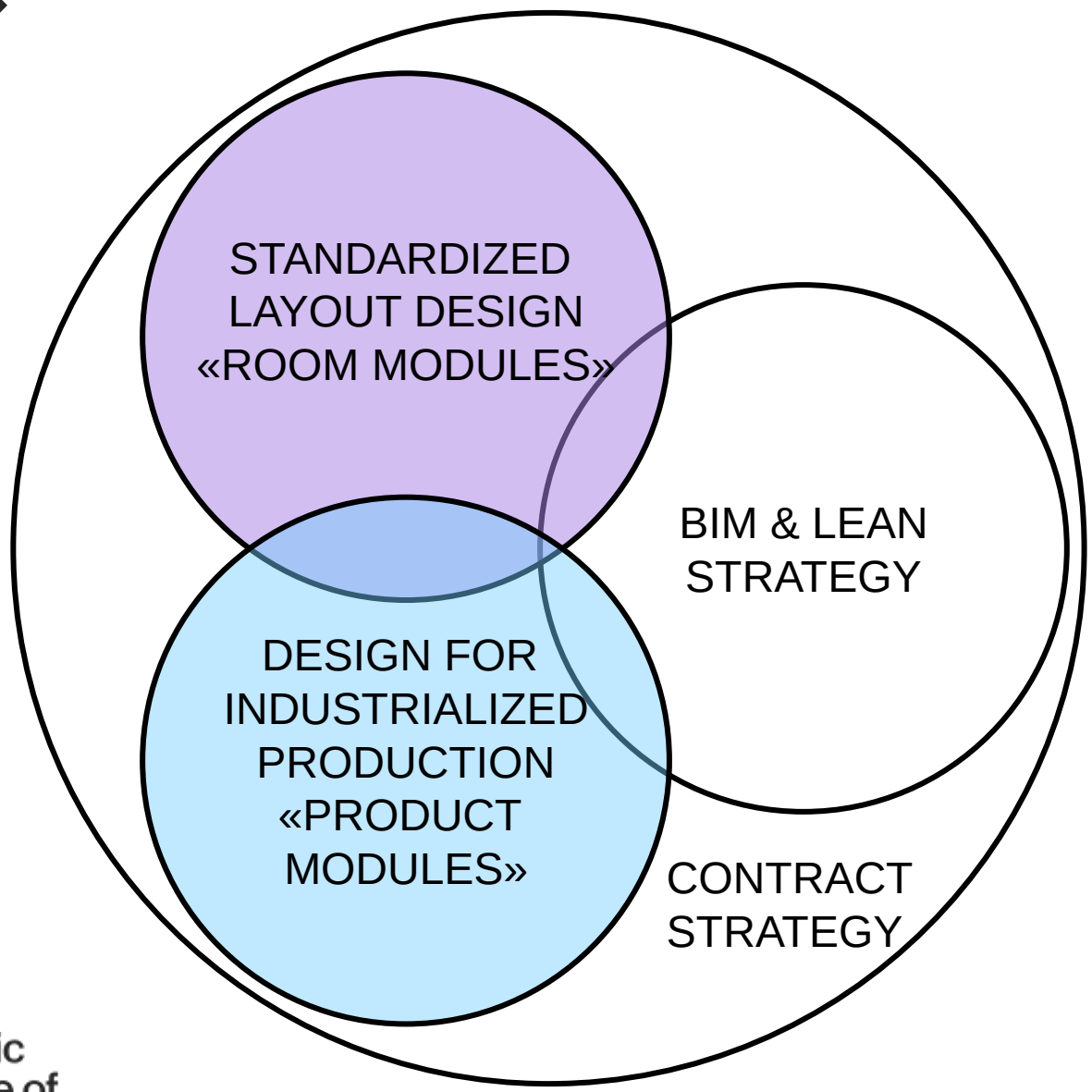

MODULAR [illegible] PROACH

Some [illegible]cted benefits:

- M[illegible]exibility in plann[illegible]eriod (changes)
- Flexibility in use (conve[illegible]s made easier)
- Better quality due to [illegible] production
- Efficient schedulin[illegible]onstruction activity
- More control (o[illegible], time & quality)
- Activating the [illegible] construction marked
- Overall positi[illegible]ffect on construction costs
- Minimizing W[illegible] on site
- Design to dissemble
- and more…

What did we achieve?

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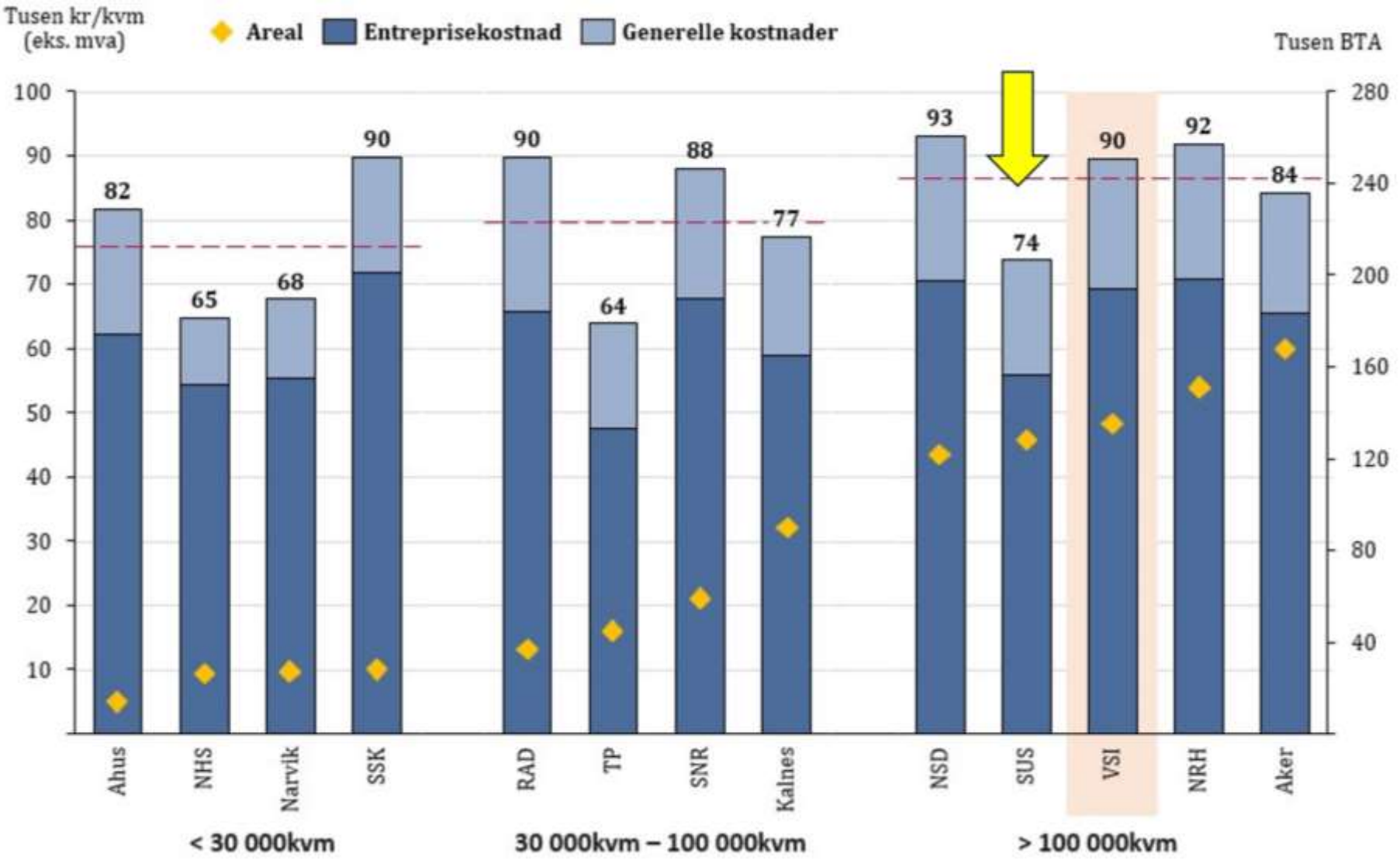
HELSE STAVANGER
Stavanger universitetssjukehus

Ahus
Nye Hammerfest sykehus
Narvik
Kalnes stråle og somatikk

Radiumhospitalet
Tønsberg sykehus
Sykehuset Møre og Romsdal
Sykehuset Østfold – Kalnes

Nytt sykehus Drammen
SUS
Sykehuset Innlandet
Nye Rikshospitalet
Nye Aker



Recent norwegian hospital projects compared: Nye SUS with about 15 - 20% lower cost per sqm

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To be continued …

NEW STAVANGER UNIVERSITY HOSPITAL – NYE SUS

HELSE STAVANGER Stavanger universitetssjukehus	PROJECT OWNER
SYKEHUSBYGG	STATE OWNED HOSPITAL BUILDING AGENCY
Nye Stavanger universitetssjukehus	PROJECT ORGANISATION
Nordic Office of Architecture	ARCHITECTS
COWI	CONSULTING ENGINEERS
AART / architects	ARCHITECTS
AAS-JAKOBSEN	STRUCTURAL ENGINEERS
SLA Urbanity | Strategy | Landscape	LANDSCAPE ARCHITECTS

Florian Wagnerberger - fw@nordicarch.com
Mobile phone: 0047 94155107