

Five Multipurpose Hospital Buildings in 20 weeks

| MHP Arnau de Vilanova | MHP Germans Trias i Pujol | MHP Bellvitge | MHP Moisès Broggi | MHP Parc Sanitari Pere Virgili

EUHPN 2023 Workshop. Copenhagen, 27-29 March 2023

Gabriela Martínez / Rafael Delgado

Gerència d'Inversions i Patrimoni

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Outline

Why? From “*Salut Respira*” to multi-purpose buildings

What? The five Multipurpose Hospital Building

How? Innovative method, Lean, IPD, BIM and Prefabricated construction

Going Forward: MHB Hospital de Sabadell and Granollers

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Why? From “*Salut Respira*” to multi-purpose buildings

What? The five Multipurpose Hospital Building

How? Innovative method, Lean, IPD, BIM and Prefabricated construction

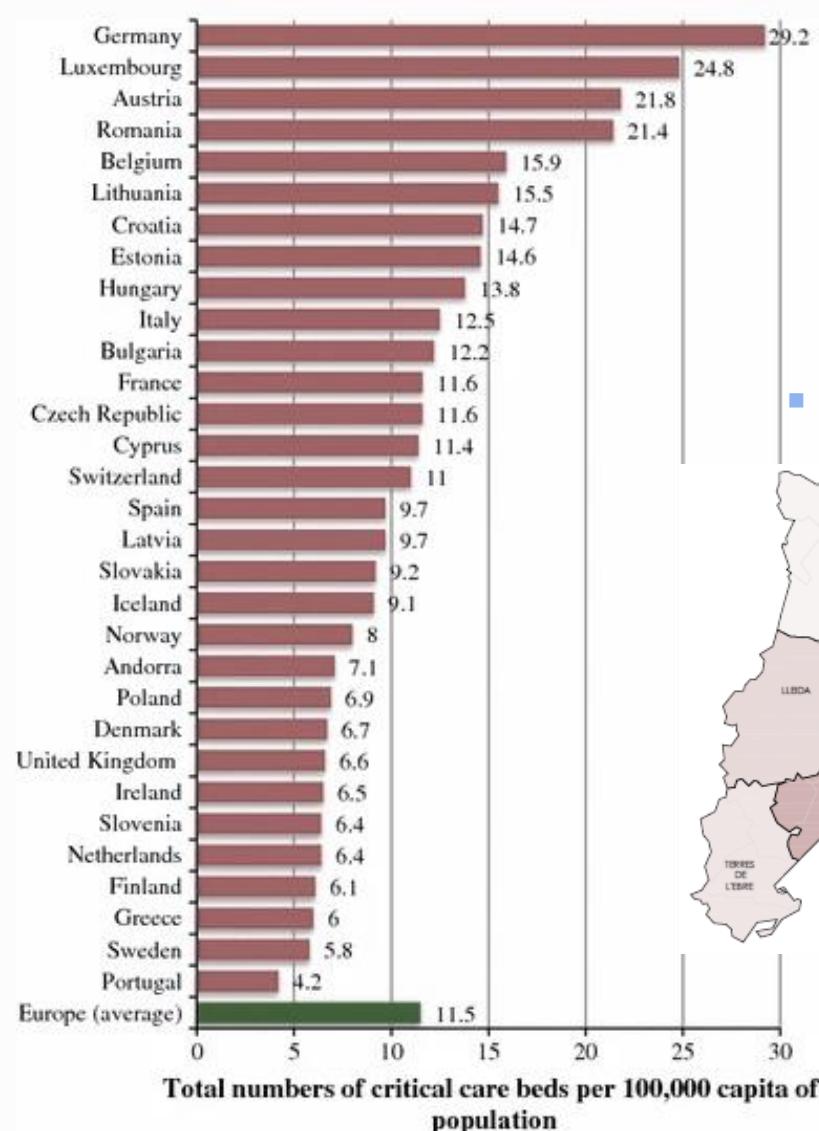
Going Forward: MHB Hospital de Sabadell and Granollers

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Why?

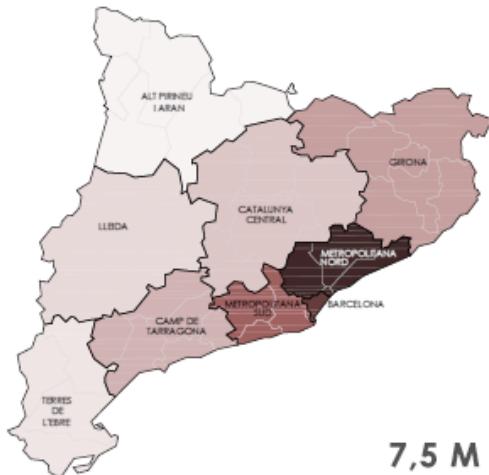
ORIGIN “Salut Respira”

The five multipurpose Hospital Buildings | MHP Arnau de Vilanova | MHP Germans Trias i Pujol | MHP Bellvitge | MHP Moisès Broggi | MHP Parc Sanitari Pere Virgili

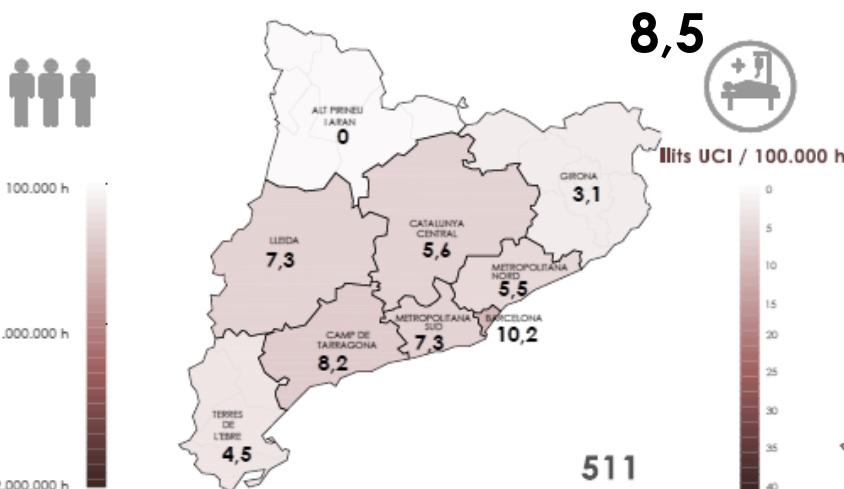


- Increasing capacity of ICU to deal with new spikes/waves in covid patients without compromising non-COVID care activity
- It would act as a “lung” or breathing space for the system

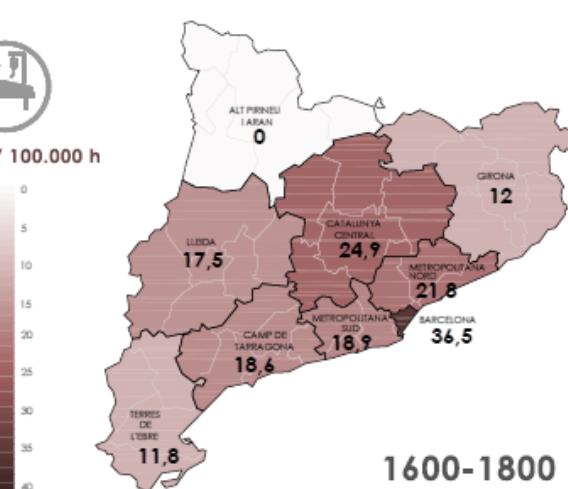
■ inhabitants



■ Critical beds NOV 2019



■ Critical beds APR 2020



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Why?

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ORIGIN “Salut Respira”



- **Just One Specialized and Centralized ICU for Covid disease**, located closed to a reference hospital, near Barcelona City Area

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Why?

The five multipurpose Hospital Buildings

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| MHP Germans Trias i Pujol

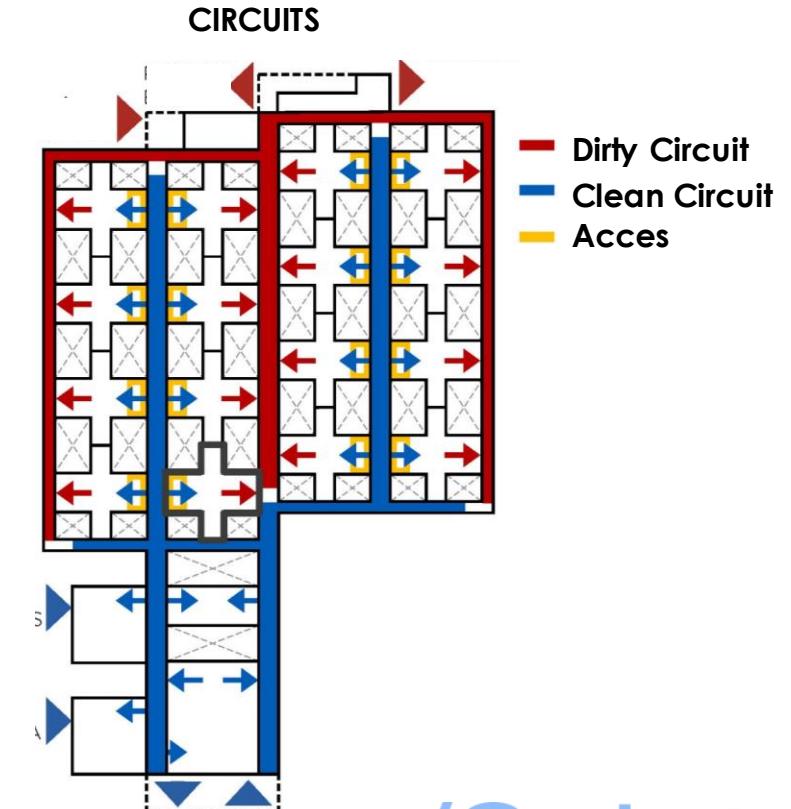
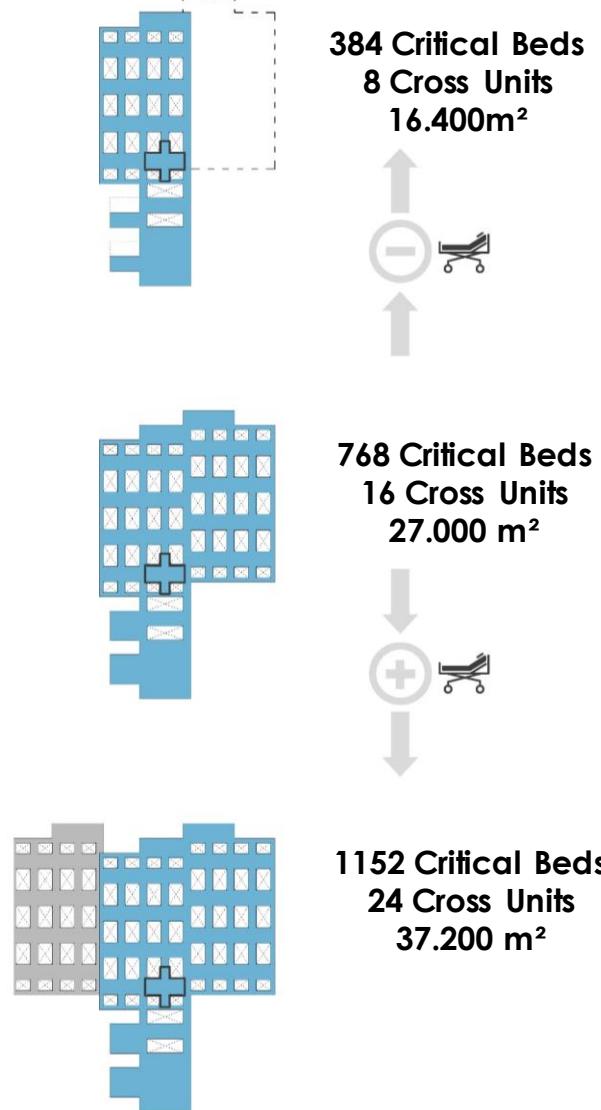
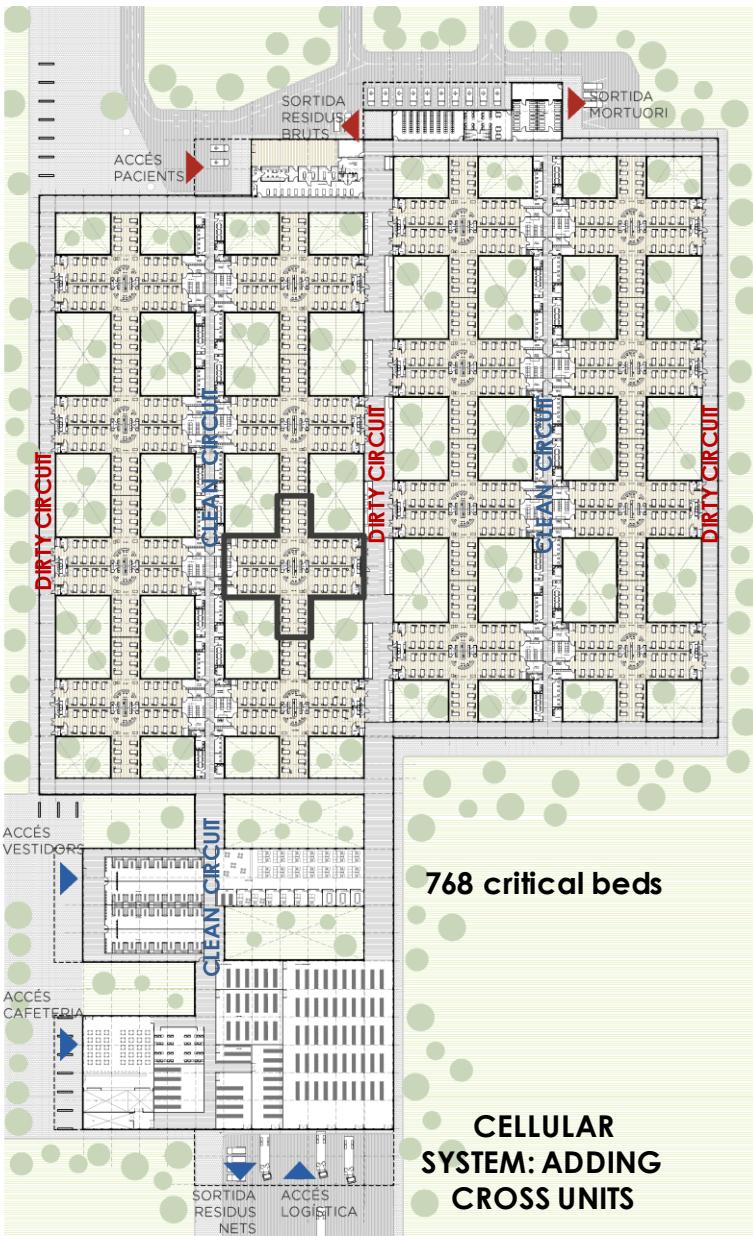
| MHP Bellvitge

| MHP Moisès Broggi

| MHP Parc Sanitari Pere Virgili

ORIGIN “Salut Respira”

- scalable, efficient, safe, flexible, comfortable & recoverable, movable



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Why?

The five multipurpose Hospital Buildings

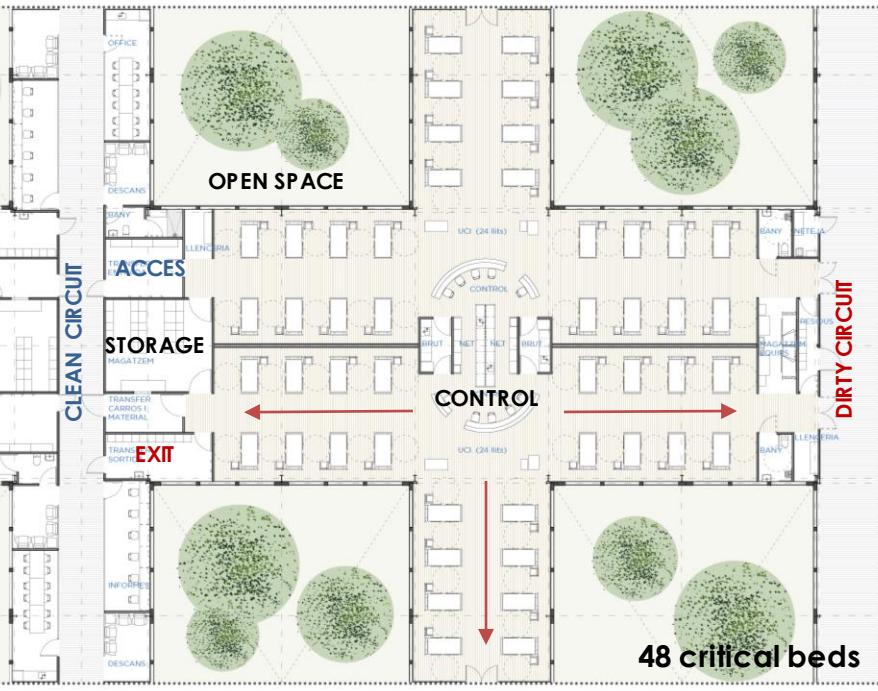
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| MHP Germans Trias i Pujol

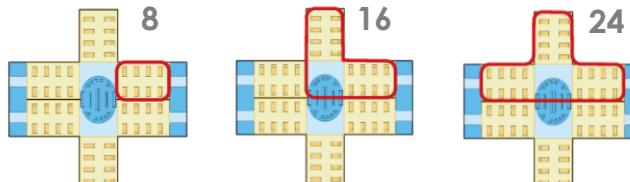
| MHP Bellvitge

| MHP Moisès Broggi

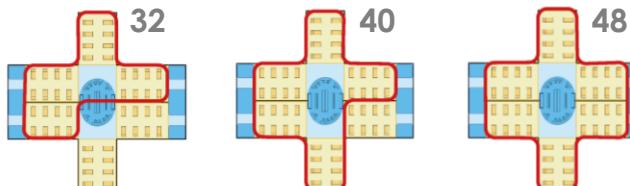
ORIGIN “Salut Respira”



CROSS UNIT



Ratios patients / nursery



- scalable, efficient, safe, flexible, comfortable & recoverable, movable



2,50 staff



1 bed

120 staff

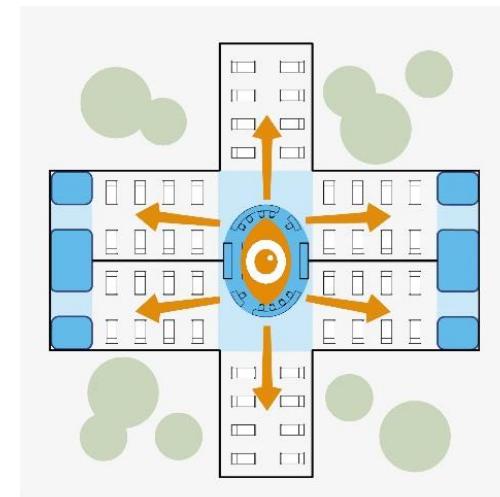
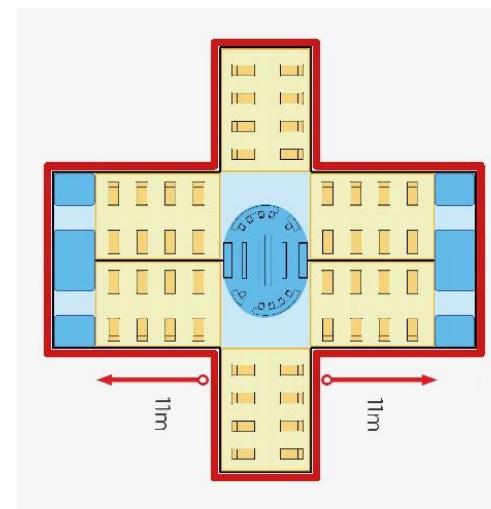


48 beds

762 m²



design based on efficiency and reduction of routes, giving maximum visual control between nursing control and patients, optimizing professional's work



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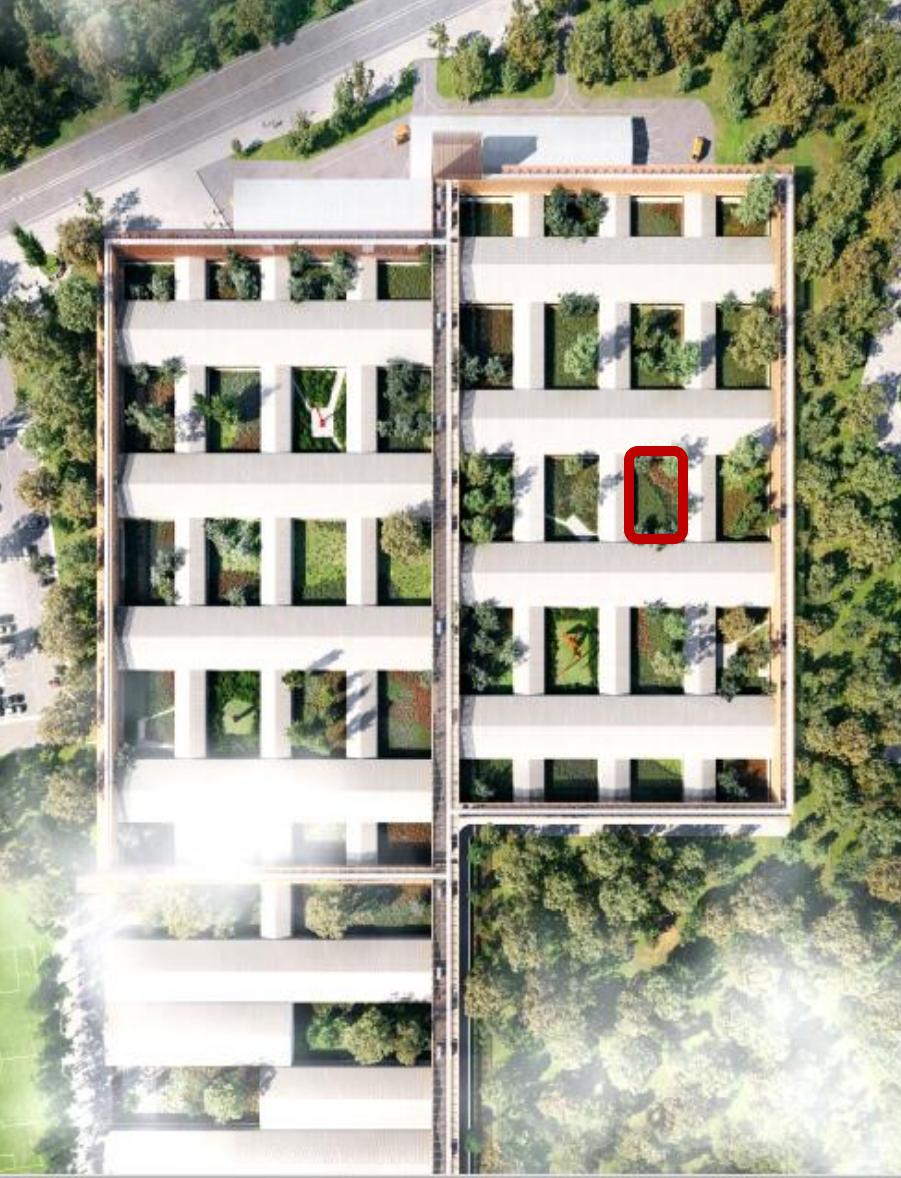
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ORIGIN “Salut Respira”

- scalable, efficient, safe, flexible, **comfortable** & recoverable, movable



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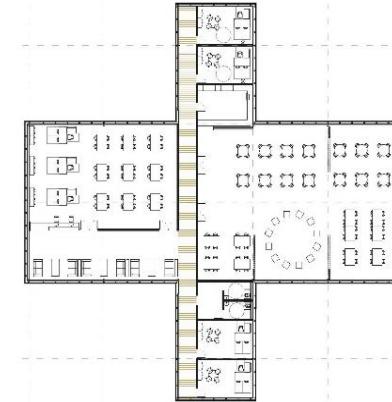
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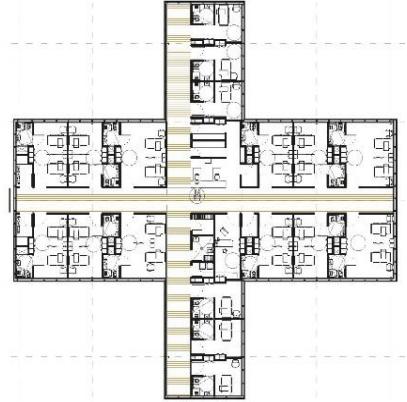
- scalable, efficient, safe, flexible, **comfortable & recoverable, movable**



Mental health Centre



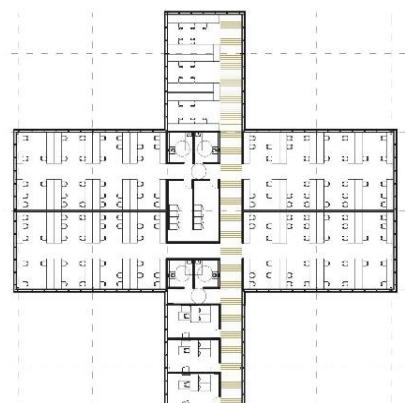
Wards



Rehabilitation



Research



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Why?

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Finishing

DIVISÒRIA INTERIOR AMB SISTMES MODULARS DE RÀPID MUNTATGE.



Flooring

SOLERA DE FORMIGÓ FRATASSAT AMB ACABAT CONTINU DE RESINES O PAVIMENT VINÍLIC DE

OPCIÓ A
ACABAT A BASE DE RESINES

OPCIÓ B
ACABAT PAVIMENT VINÍLIC



Foundations

FONAMENTACIÓ A BASE DE SABATES CORREGUDES DE FORMIGÓ AMB PLAQUES D'ESPERA PEL MUNTATGE DE L'ESTRUCTURA METÀLICA



Ventilation

CONDUCTES DE VENTILACIÓ TÈXTILS: LLEUGERS, DE RÀPID MUNTATGE I AMB LA POSSIBILITAT DE DESMUNTAR PEL SEU RENTAT.



Structure

ESTRUCTURA DE PÒRTICS METÀL-LICS FABRICATS A TALLER I MUNTATS A OBRA AMB GRAN OPTIMITZACIÓ DE LES LLUMS ESTRUCTURALS.



Roof

COBERTA DE PANELL METÀL-LICS TIPUS SANDWITX. PER GARANTIR L'ESTANQUEITAT A L'AIGUA ES DÓNA CONTINUITAT AMB LA FAÇANA.



Facade

FAÇANA DE PANELL PREFABRICAT MODULAR DE FUSTA AMB LES FINESTRES I LES INSTAL·LACIONS INCLOSES. EL MUNTATGE ES REALITZA A OBRA

LEGENDA DETALL

P01: Panel de coberta sandwitz de xapa metàllica
P02: finestra correguda amb marc d'alumini fosc
P03: Lámina impermeable transpirable tipo Tyvek UV o equivalent
P04: Allatament de fibra de fusta de 20mm d'espesor
P05: Tauler d'OSB
P06: Allatament
P07: Estructura interior de muntant de fusta d'abet de 40x80mm cada 610mm
P08: Lámina reguladora de vapor
P09: Doble placa de pladur de 15mm

P01: Revestiment exterior Tipus A o Tipus B
P02: Rastrell vertical de pi pintat de negre de secció 25x40 cada 1000mm
P03: Lámina impermeable transpirable tipo Tyvek UV o equivalent
P04: Allatament de fibra de fusta de 20mm d'espesor
P05: Tauler d'OSB
P06: Allatament
P07: Estructura interior de muntant de fusta d'abet de 40x80mm cada 610mm
P08: Lámina reguladora de vapor
P09: Doble placa de pladur de 15mm

Dividers

ENVÀ DIVISORI DE SISTEMA PREFABRICAT AMB SUPORT D'INSTAL·LACIONS I IMATGE FOTOGRÀFICA DE GRAN FORMAT, EN TOTA LA SEVA LONGITUD



P01
TIPUS A

P01
TIPUS B

P02

P03

P04

P05

P06

P07

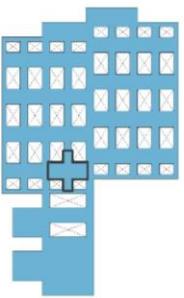
P08

P09

Quick Construction

Prefabricated solutions

10 weeks : 768 critical beds



768 Critical Beds
16 Cross Units
27.000 m²

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Why?

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ORIGIN “Salut Respira”

The centralized model had to be abandoned.



- Quick construction
 - Preindustrialized
 - Versatility and adaptability
-
- 
- Unable to be managed
 - Lack of medical staff

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The MHB was considered the alternative.



- **a satellite building that allows for a quick response to pandemic situations.**
- **a complement or extension of hospitals.**
- **absorbing patients who need intensive care (ICU).**
- **Up to 108 ICU Beds**

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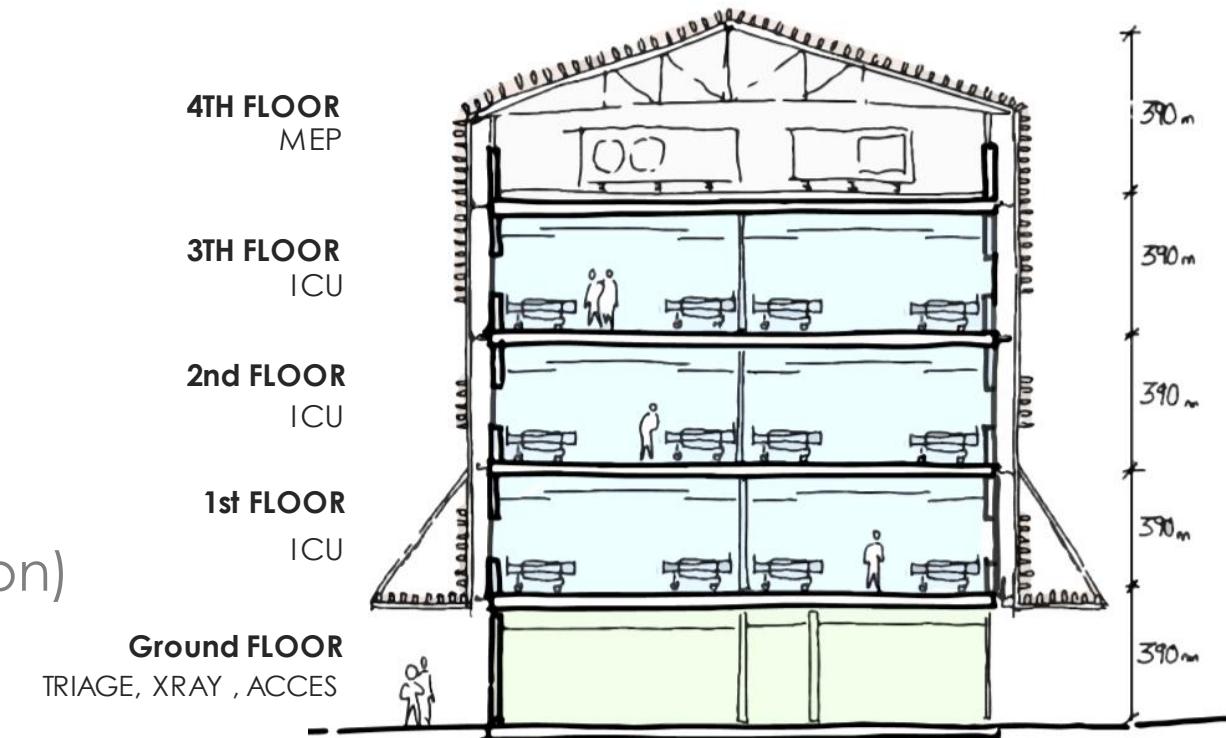
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MHB Architectural and Design Features

- “Lung” Building up to 108 beds
- Enhance functional efficiency
- Better management efficiency
- Focus on staff Safety
- Comfortable and pleasant
- Industrialized (quick and quality construction)
- Compactness
- Located in hospitals with known prior needs
- Multi-purpose, versatile, modifiable and convertible



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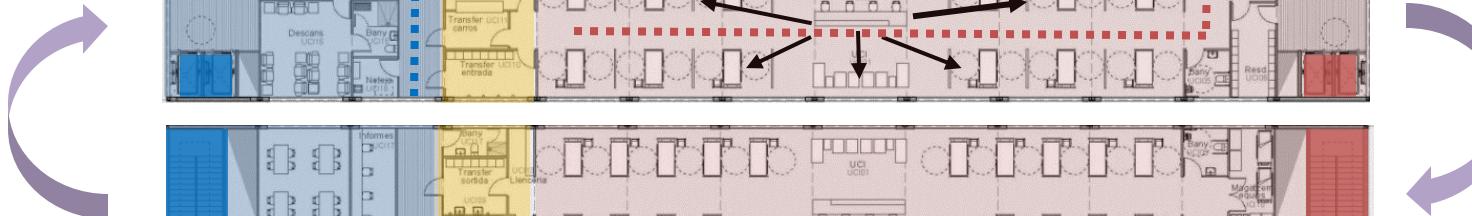
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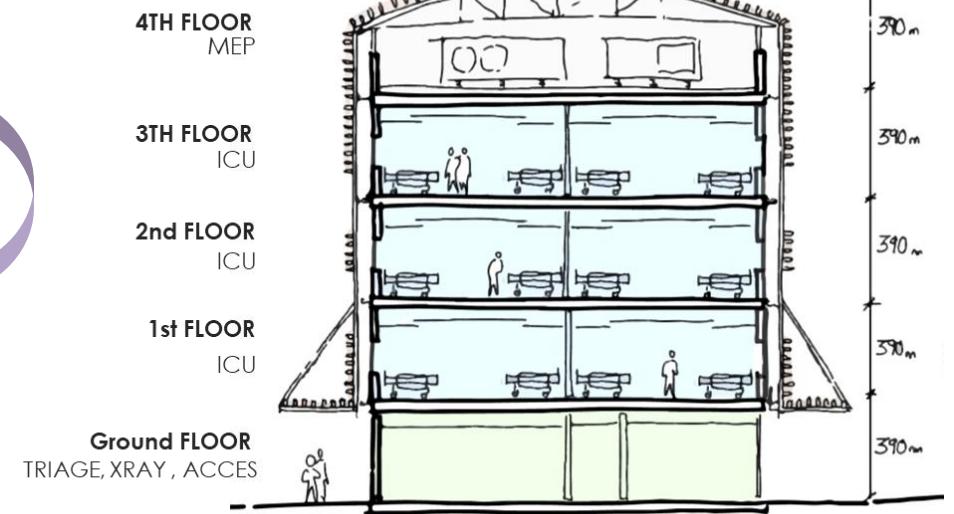
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Versatile:

24-36 extra critical beds per floor



UCI convencional / UCI emergència en 24h



As strategical reserve: it could be re-configured for pandemic use in 24-48 hours in the event of an outbreak or pandemic

In a pandemic or outbreak situation:

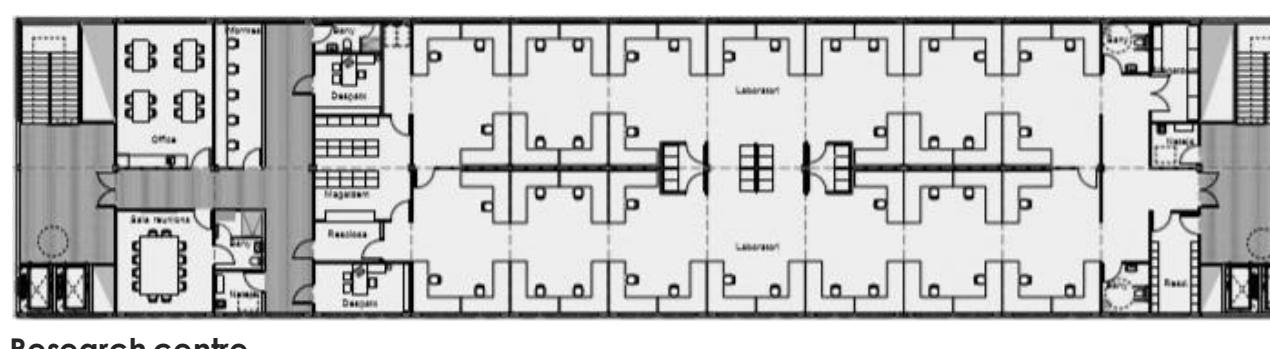
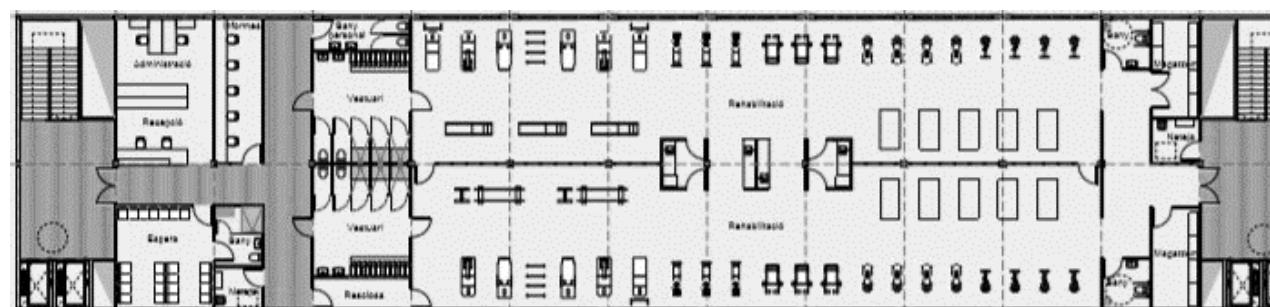
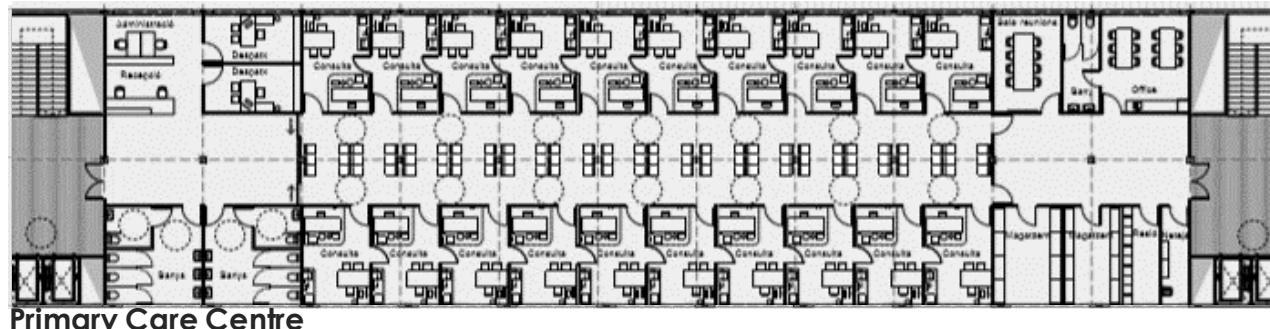
it contributes to isolate COVID patients, freeing up care areas in the main hospital where ordinary activity can be maintained.

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Flexibility in Post-pandemic situation



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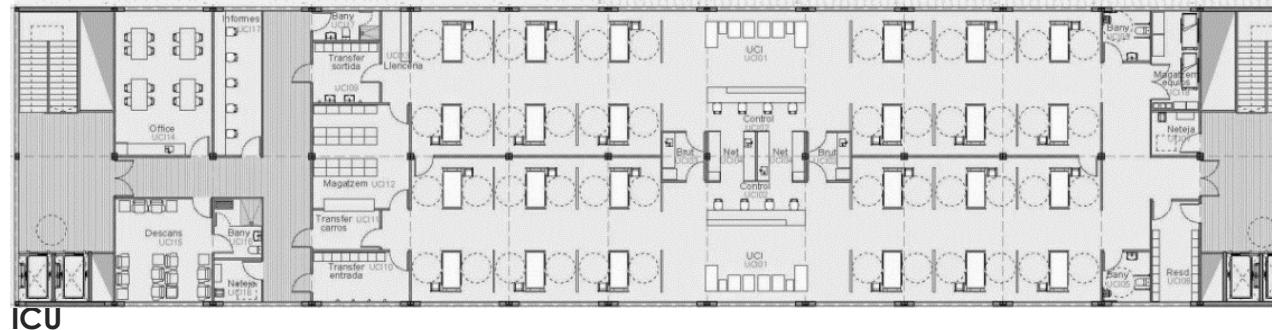
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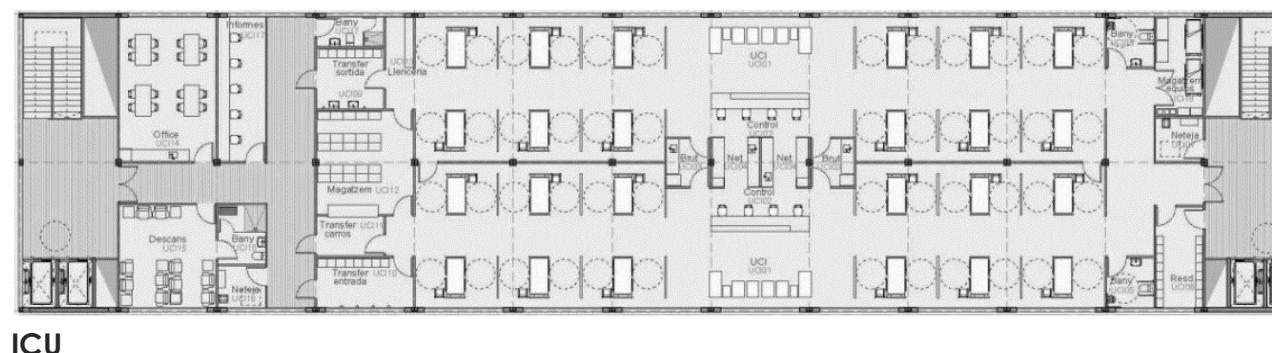
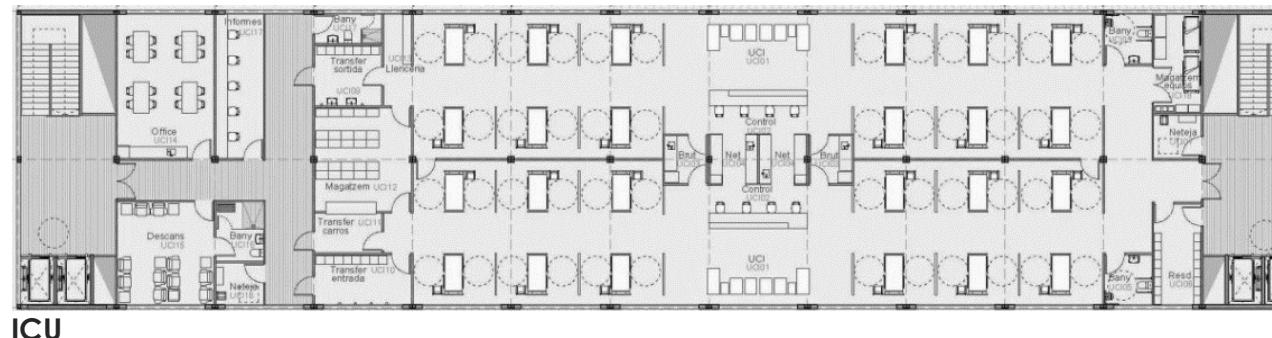
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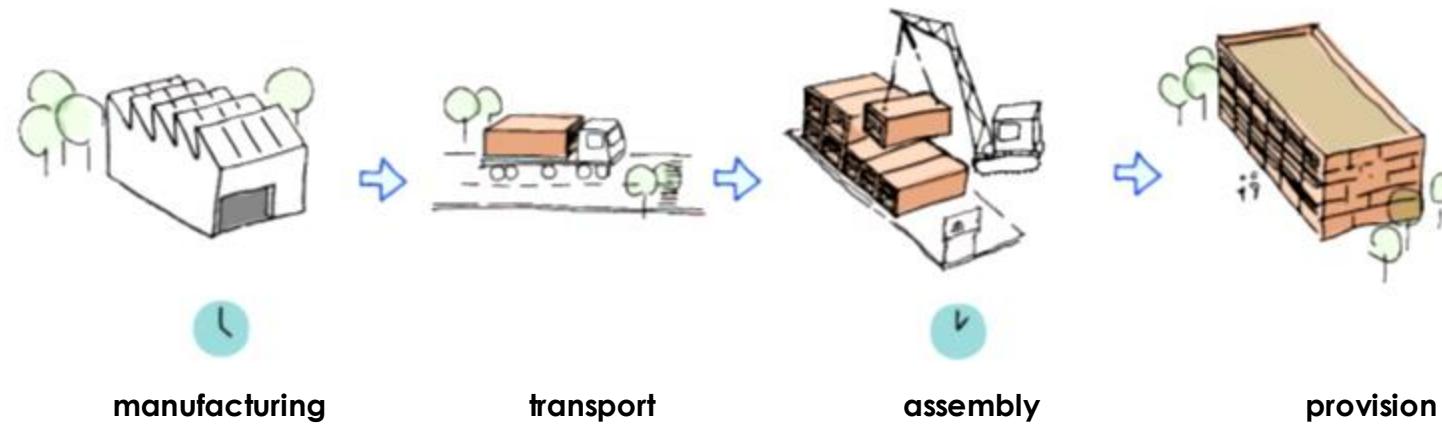
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MHP Public Procurement premises

- **Pre-industrialized or modular construction** system that guarantees quality, adjustable terms and future adaptability.
- **Estimated cost around 12.500.000€**

The public procurement budget incorporated the cost of construction work, fees of architects and engineers, the equipment and the cost of urbanization and demolition work.



What?

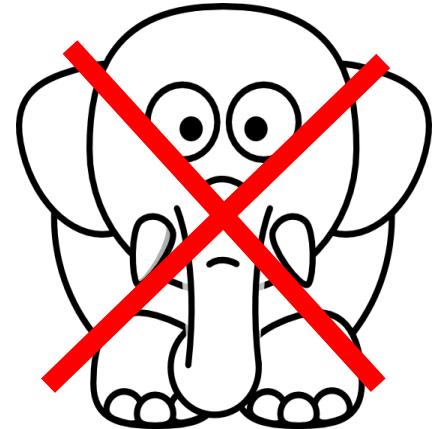
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Located in hospitals with known prior needs



- **Urban feasibility**
- **Close to a reference hospital**
- **Respond to future expansion needs**



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What?

The five multipurpose Hospital Buildings

| MHP Arnau de Vilanova

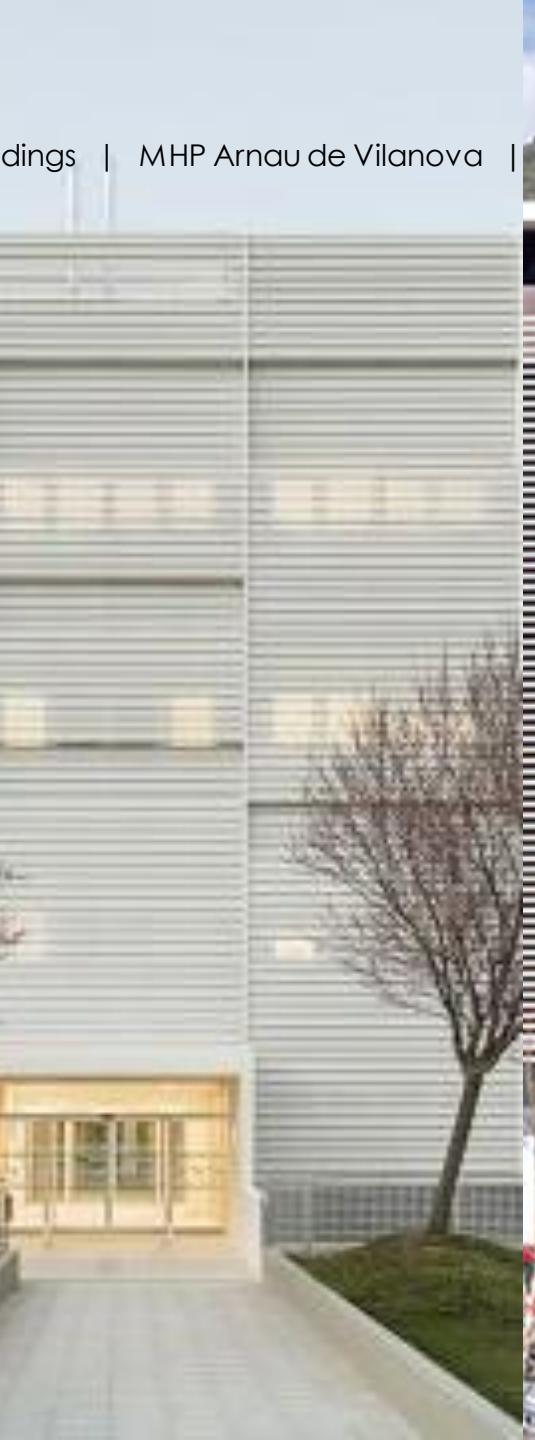
The Multi-purpose Hospital Building Arnau de Vilanova

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| MHP Bellvitge

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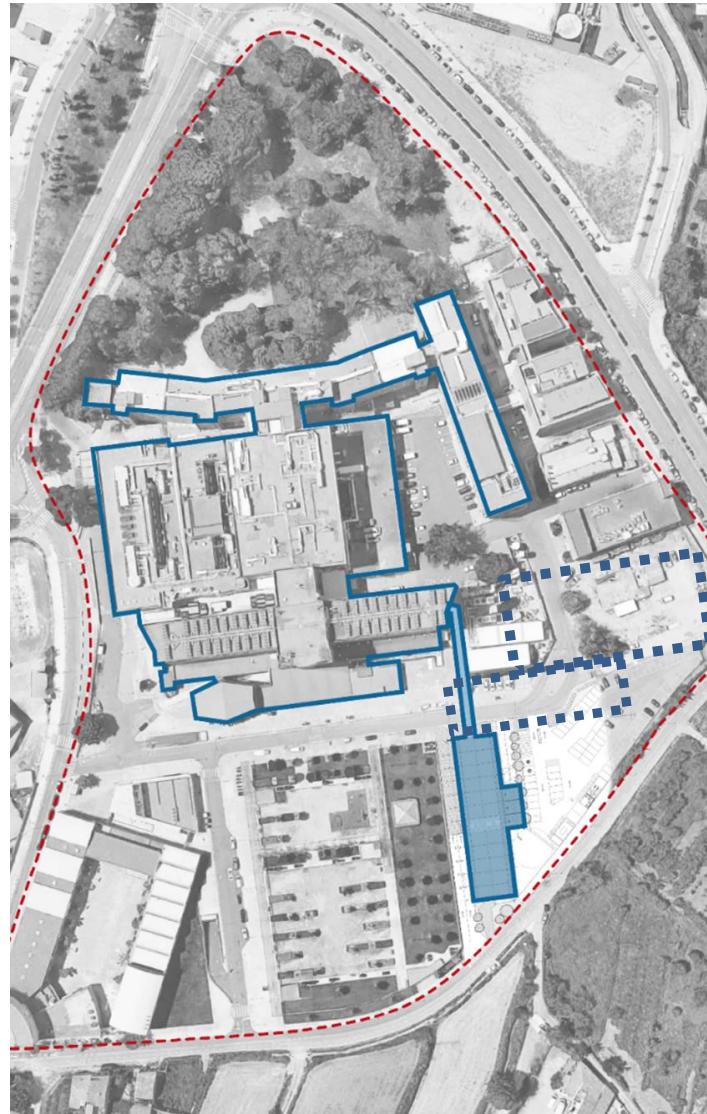
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The Multi-purpose Hospital Building Arnau de Vilanova



4.816 m²

12.580.000 M €

Original Use

PB	Acces Support services Xray
P1	UCI Multi-purpose 26
P2	UCI Departmentalised (4*5+4*3) 32
P3	UCI Departmentalised (4*5+4*3) 32
P4	MEP
TOTAL	90 Beds

Future Use

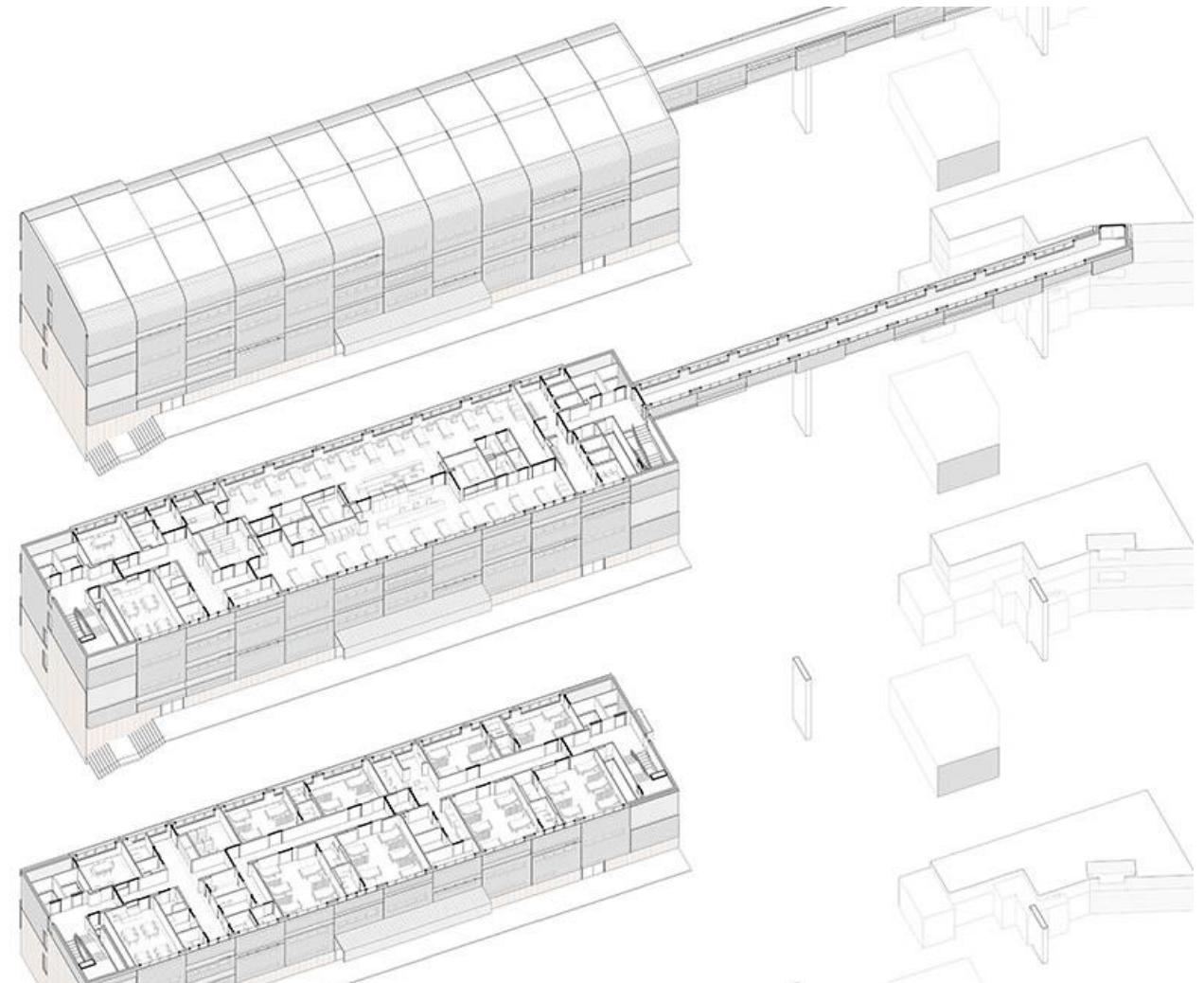
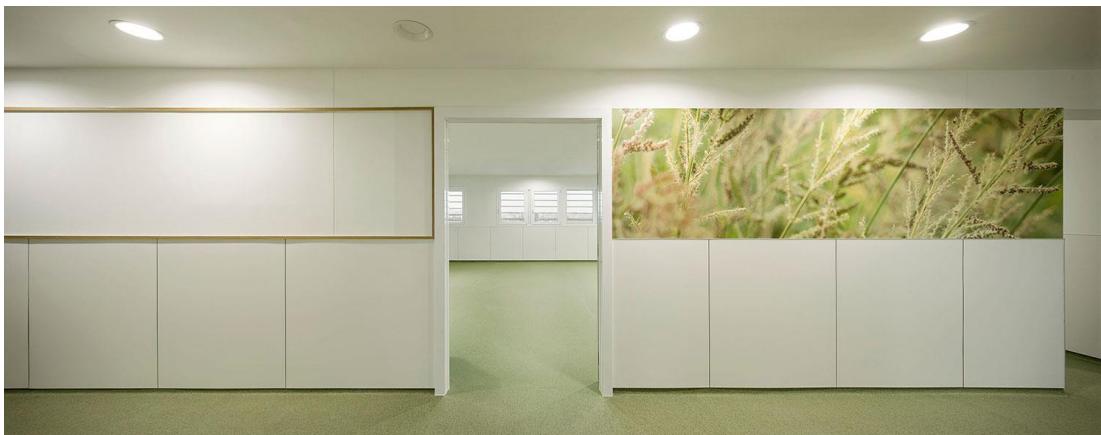
Hospital Day and Oncological Out-patients unit
Hospital U. Arnau de Vilanova

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What?

The Multi-purpose Hospital Building Parc Sanitari Pere Virgili

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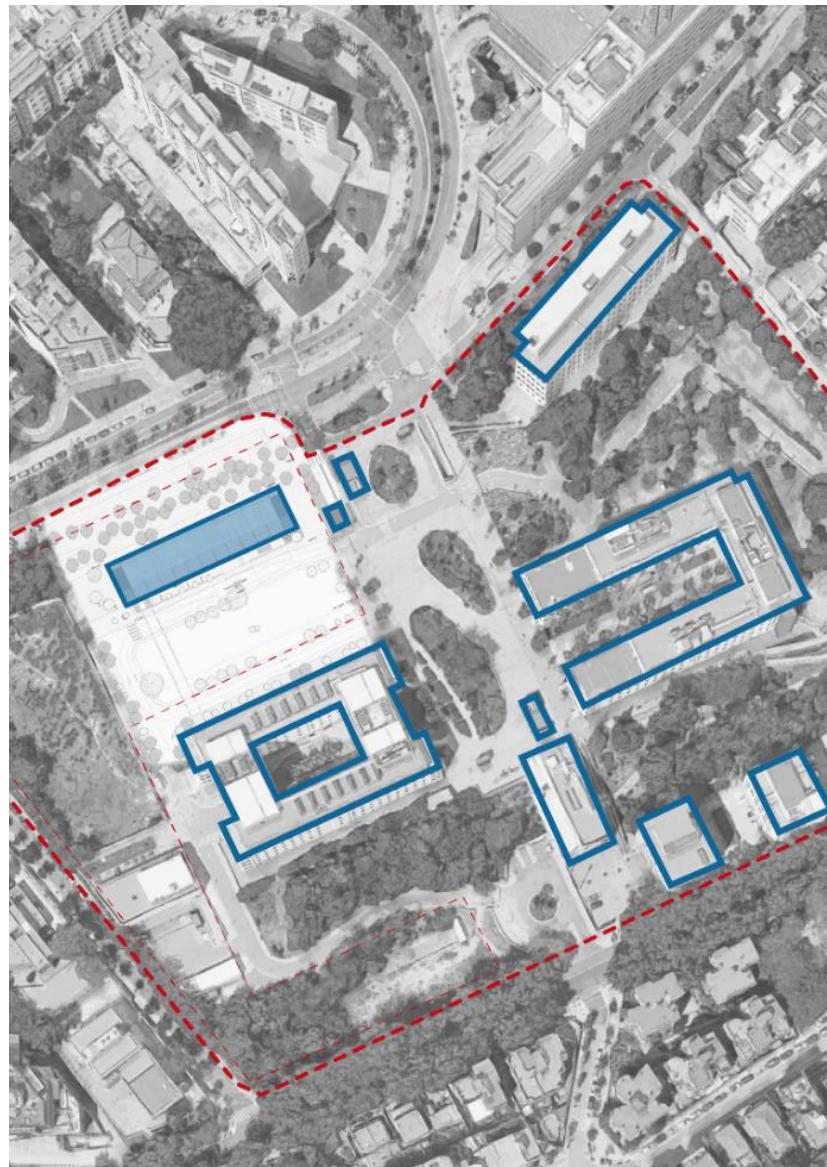


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The Multi-purpose Hospital Building Parc Sanitari Pere Virgili

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4.066,64 sqm

13.890.000 €

Original Use

PB	Acces Support services Xray
P1	UCI Multi-purpose 26
P2	UCI Departmentalised (4*b+*3b) 32
P3	UCI Departmentalised (4*b+*3b) 32
P4	MEP
TOTAL	90 Beds

Future Use

Buffer device, It can host uses of the Vall d'Hebron Hospital and also socio-sanitary **nouse-home uses of the Pere Virgili Sanitary Park.**

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The Multi-purpose Hospital Building Parc Sanitari Pere Virgili

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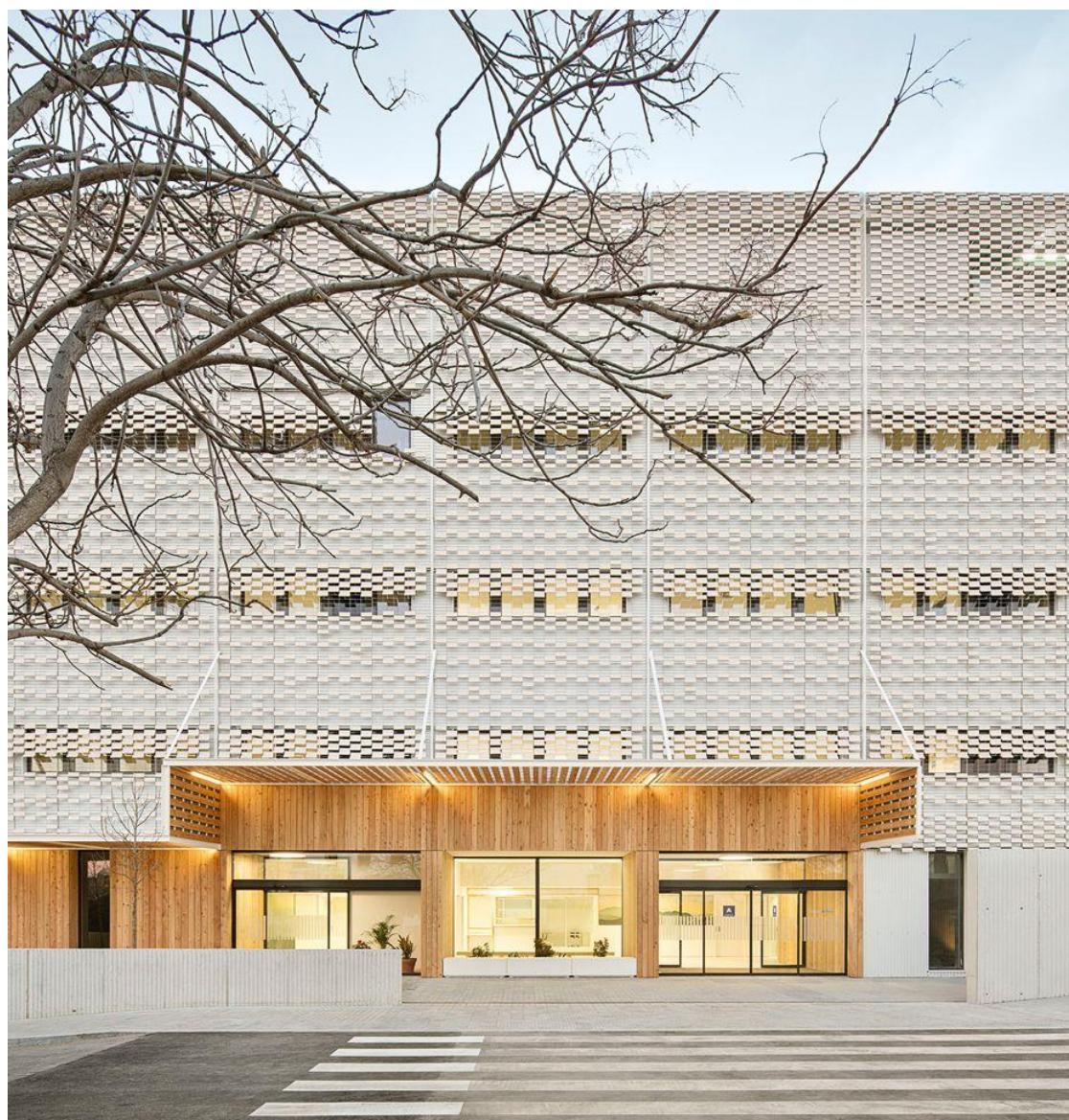


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What?

The Multi-purpose Hospital Building Germans Trias i Pujol

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The Multi-purpose Hospital Building Germans Trias i Pujol



5.402,35 sqm

13.930.000 €

Original Use

PB	Acces
P1	ICU Multi-purpose I 44b
P2	ICU Multi-purpose I 44b
P3	ICU Departmental I 20 b
P3	MEP
TOTAL	108 Beds

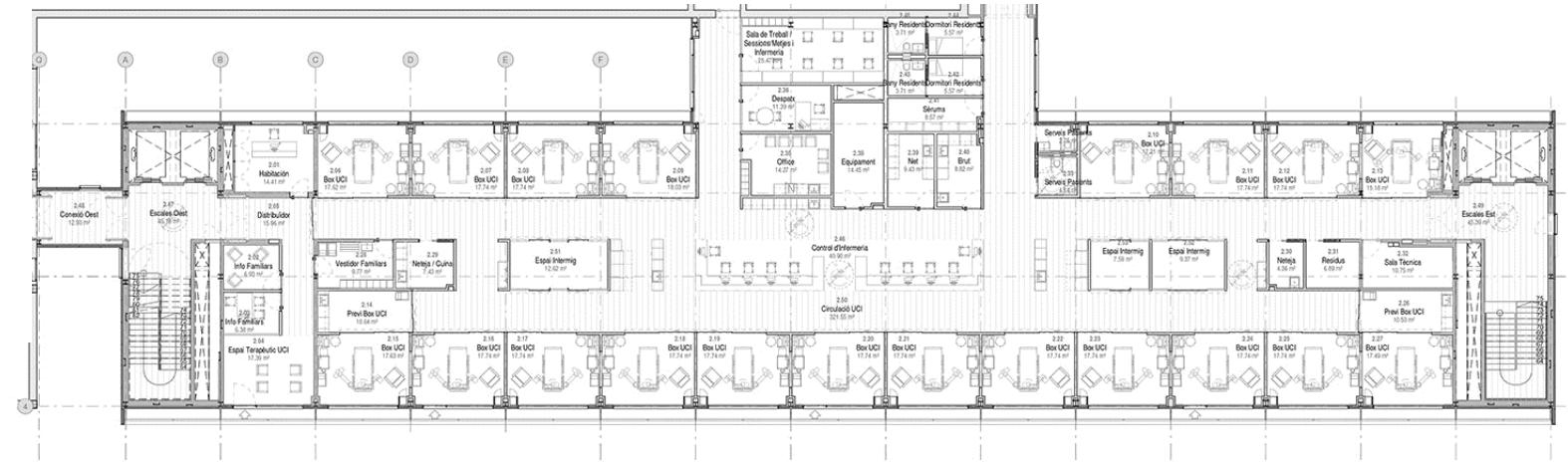
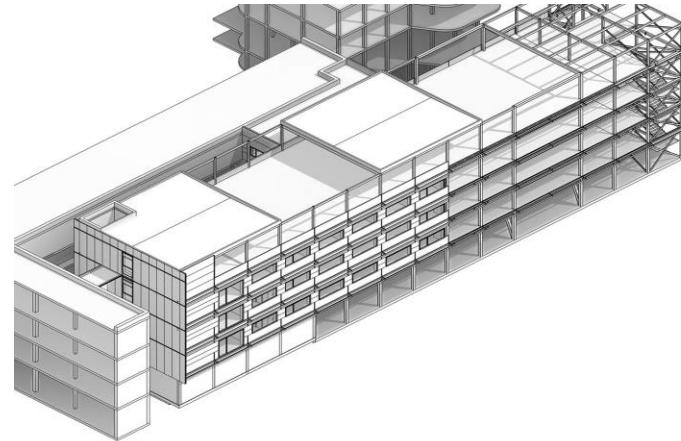
Future Use

- P03 Increasing the demanded UCI's beds departmental.
- P02 Recovering of future surgical area
- P01 Day Hospital.

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The Multi-purpose Hospital Building Germans Trias i Pujol



/Salut

What?

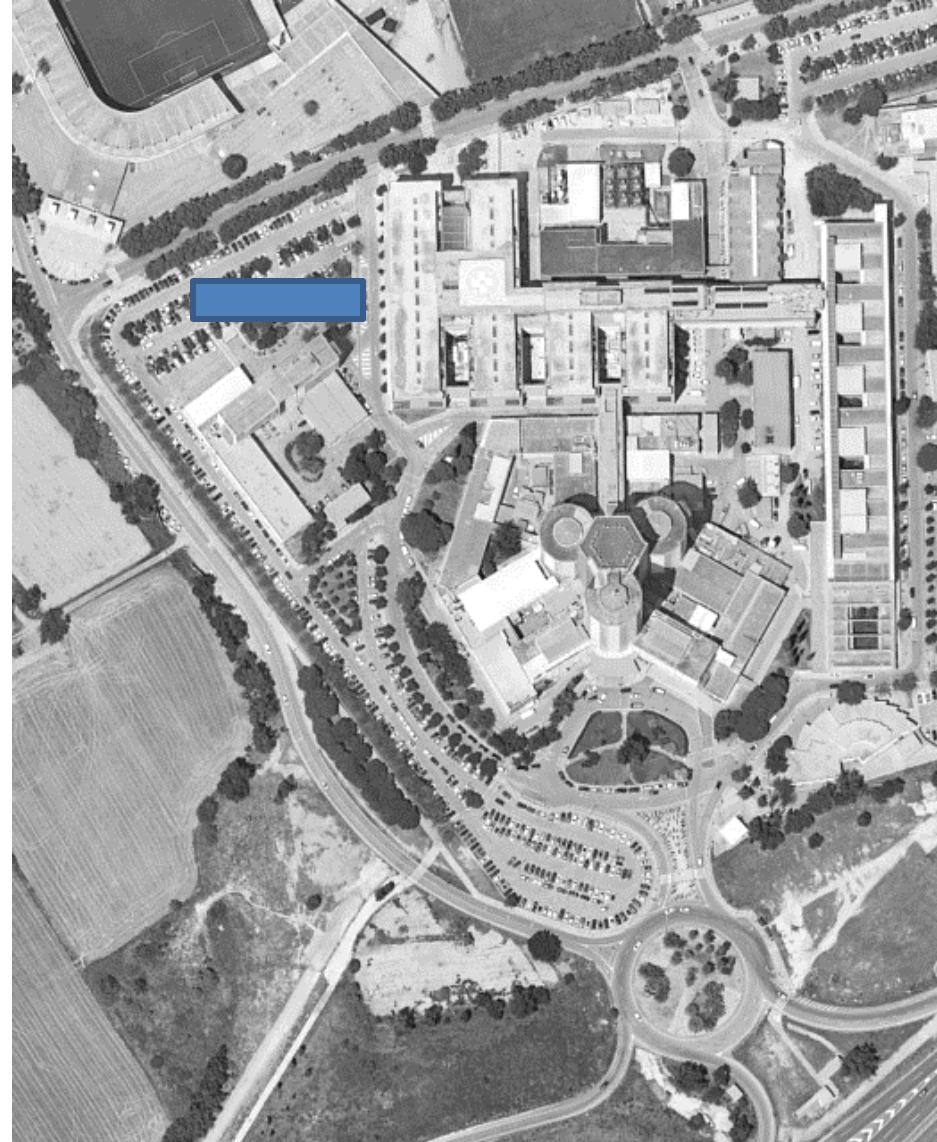
The Multi-purpose Hospital Building Bellvitge

The five multipurpose Hospital Buildings | MHP Arnau de Vilanova | MHP Germans Trias i Pujol | MHP Bellvitge | MHP Moisès Broggi | Parc Santari Pere Virgili



What?

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The Multi-purpose Hospital Building Bellvitge

4.839,65 sqm

13.450.000 €

Original Use

PB	ER 18 beds Acces and Xray
P1	ER 30 beds
P2	Hospitalization 14 double bedroom + 4 simple bedrrrom
P3	hospitalization 14 double bedroom + 4 simple bedrrrom
P4	MEP + Changing room
TOTAL	48 ER points + 64 Inpatients beds

Future Use

P01,P02 I P03 neurological centre

/Salut

What?

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What?

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What?

The Multi-purpose Hospital Building Moisès Broggi

The five multipurpose Hospital Buildings

MHP Arnau de Vilanova | MHP Germans Trias i Pujol | MHP Bellvitge | MHP Moisès Broggi | MHP Parc Sanitari Pere Virgili



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What?

The Multi-purpose Hospital Building Bellvitge

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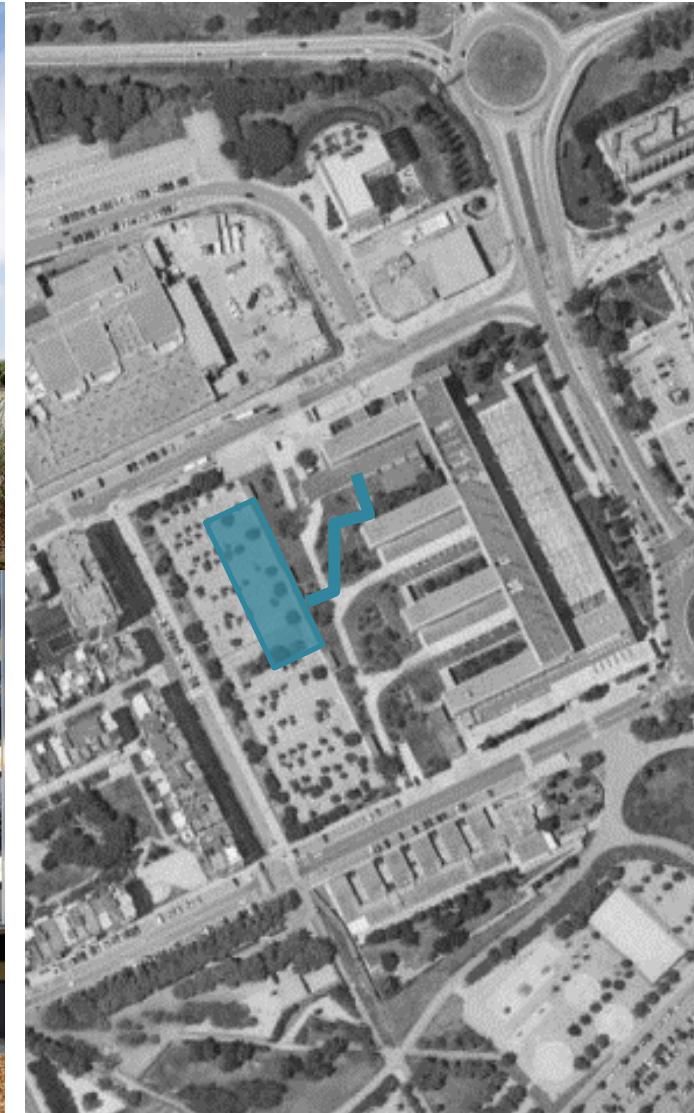
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What?

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The Multi-purpose Hospital Building Moisès Broggi



4. 643,05 sqm

11. 910.000 €

Original Use

PB	Acces and Xray
P1	ICU Multi-purpose 24 beds + 4 isolated
P2	ICU Multi-purpose 24 beds + 4 isolated
P3	ICU Multi-purpose 24 beds + 4 isolated This floor was never finished
P4	MEP
TOTAL	56 ER points + 64 Inpatients beds

Future Use

**P01,P02 I P03, Oncological hospital day,
P00 Imagering**

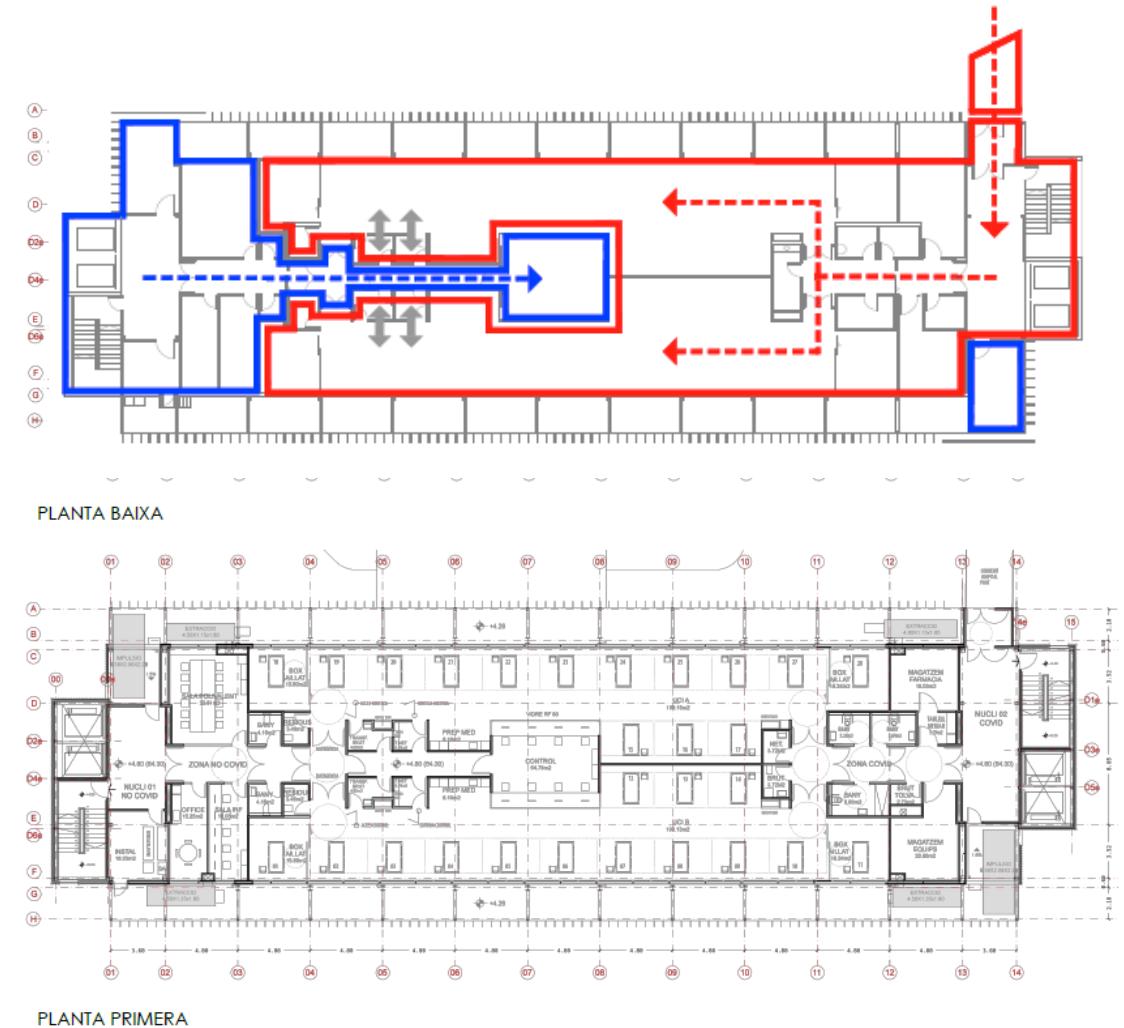
/Salut



What?

The Multi-purpose Hospital Building Moisès Broggi

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What?

The Multi-purpose Hospital Building Moisès Broggi

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/Salut

Why? From “*Salut Respira*” to multi-purpose buildings

What? The five Multipurpose Hospital Building

How? Innovative method, Lean, IPD, BIM and Prefabricated construction

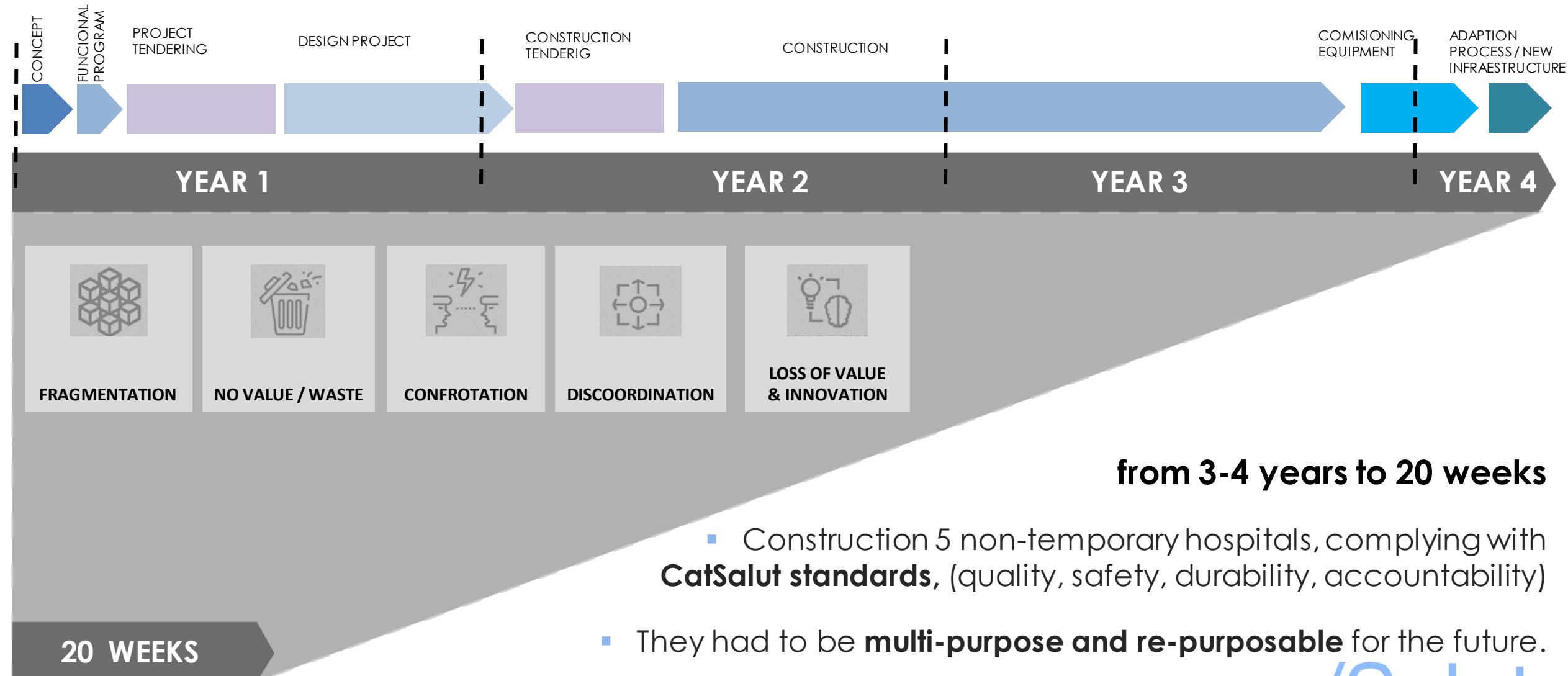
Going Forward: MHB Hospital de Sabadell and Granollers

/Salut

How?

Innovative Method

The five multipurpose Hospital Buildings | MHP Arnau de Vilanova | MHP Germans Trias i Pujol | MHP Bellvitge | MHP Moisès Broggi | MHP Parc Sanitari Pere Virgili

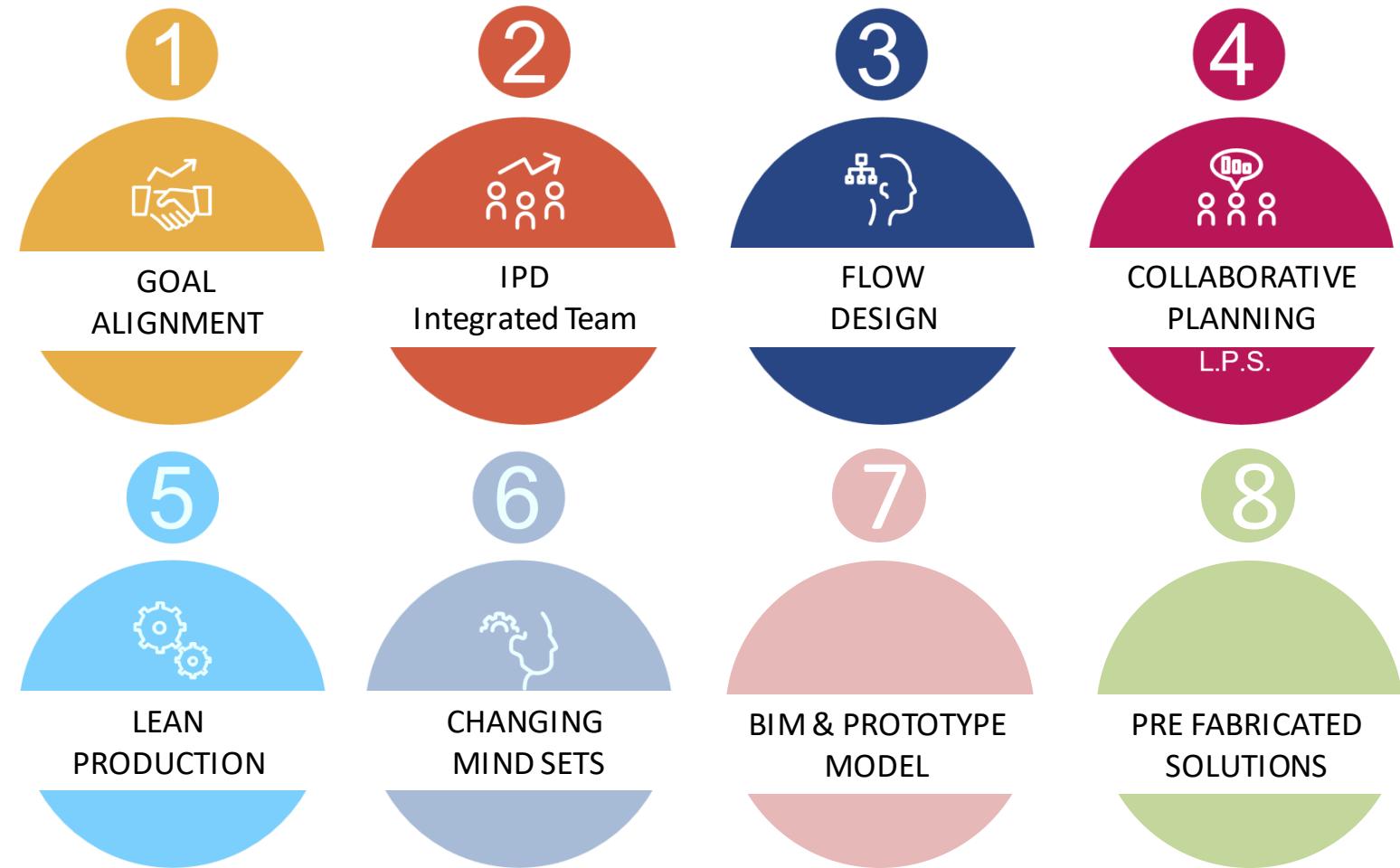
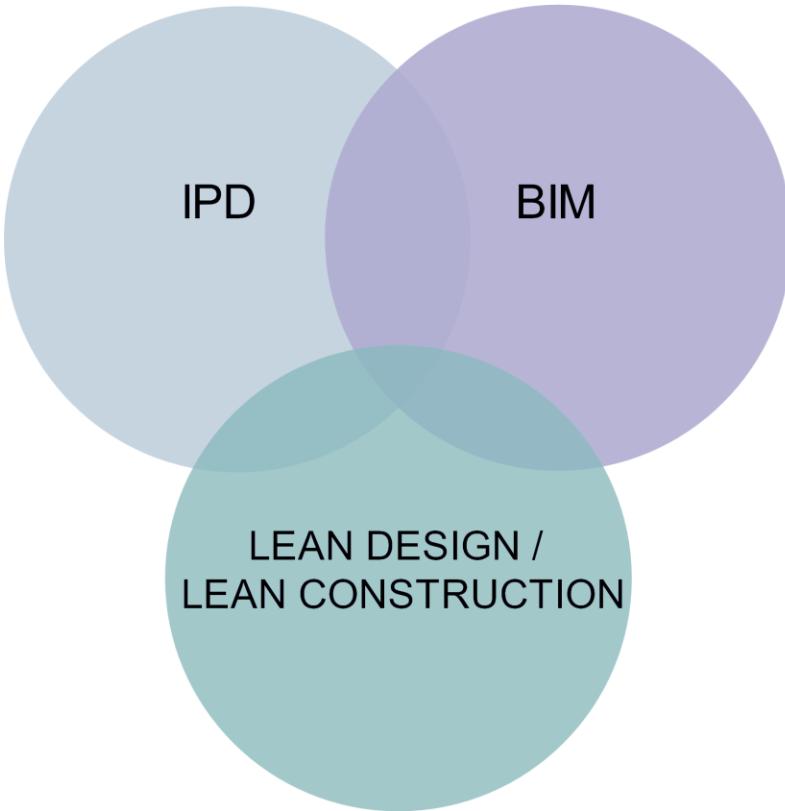


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How?

Innovative Method

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How?

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Innovative Method

1



GOAL
ALIGNMENT



CONSTRUCTION
COMPANY



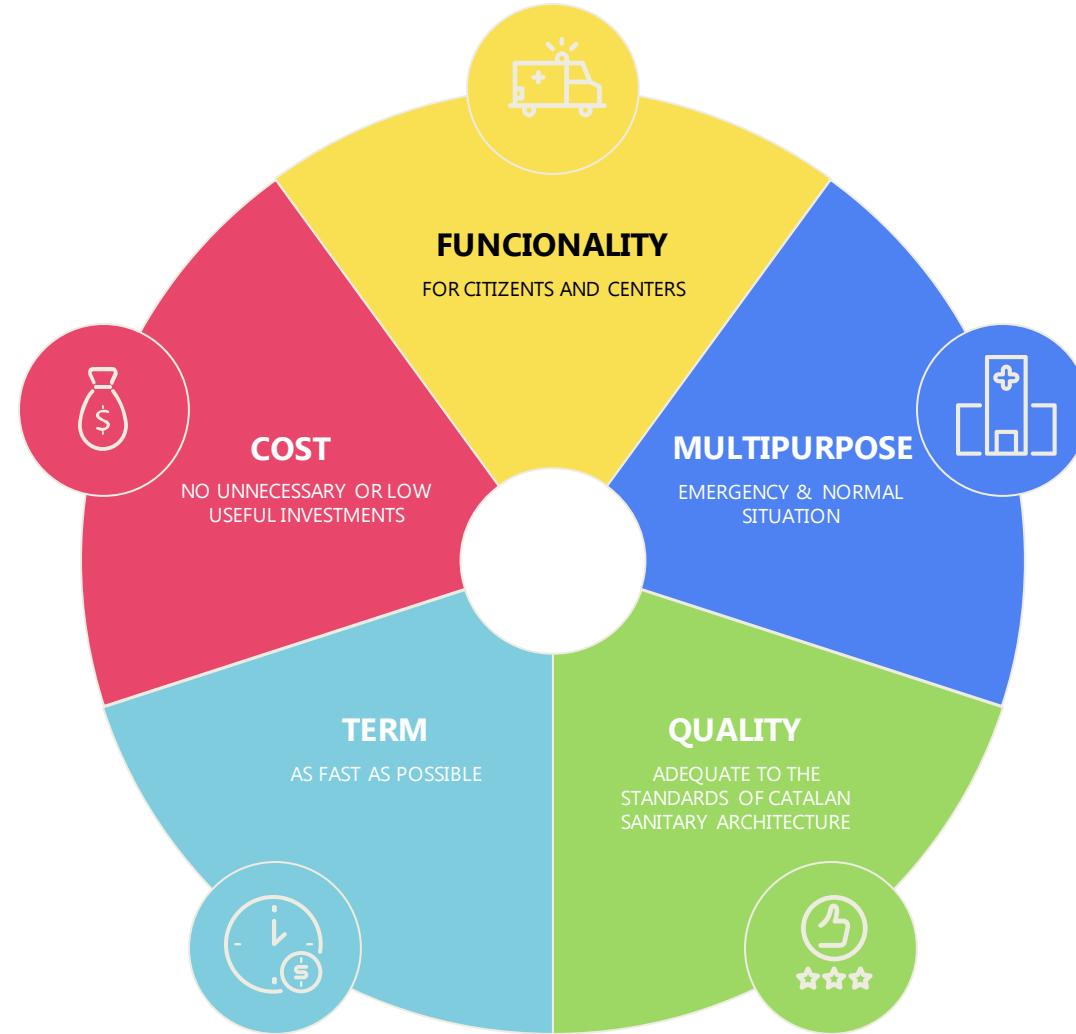
HOSPITAL



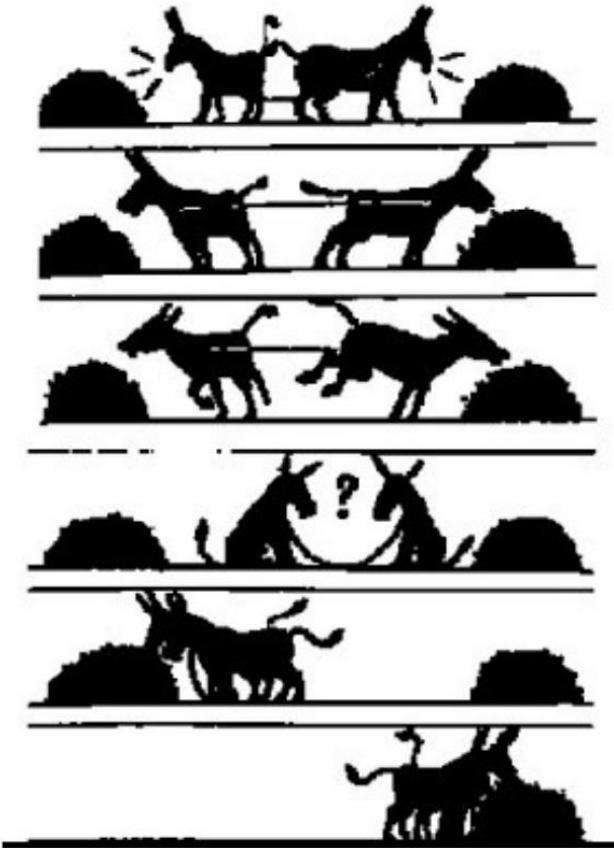
ARCHITECTS /
ENGINEERS



SURVEYING
MANAGEMENT



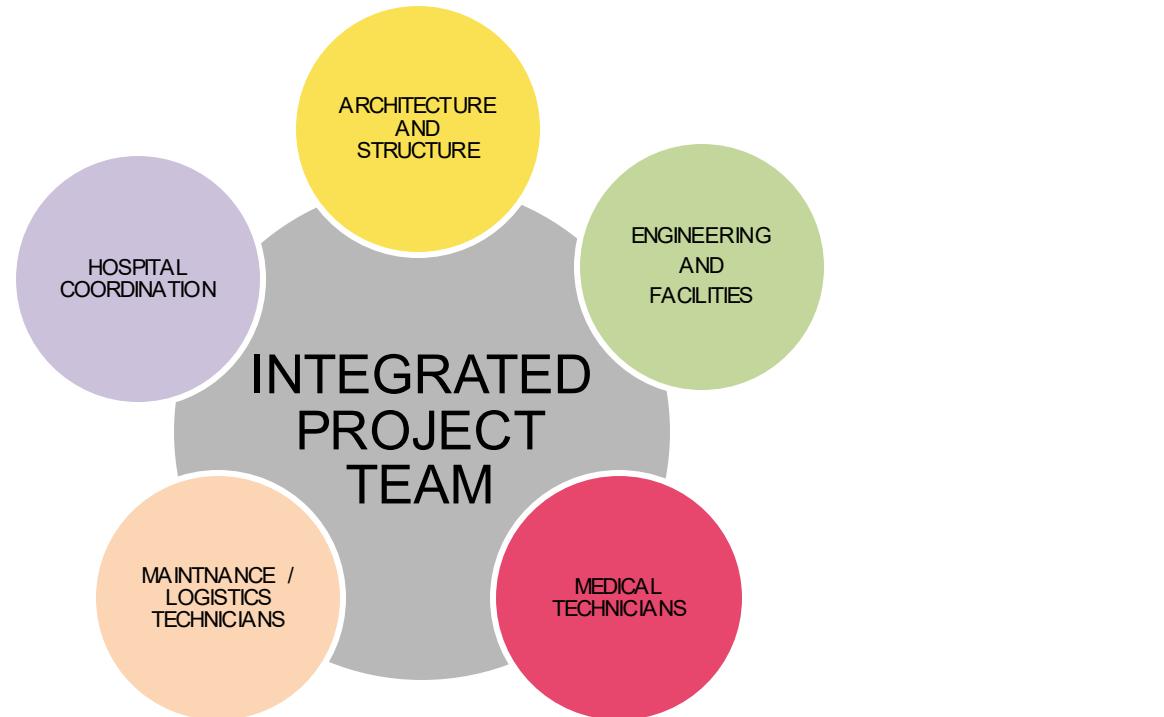
CONFIDENCE



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How?

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Innovative Method

- **Multidisciplinary Team**
- **Technical skills**
- Ability to make good **decisions in a short time.**

/Salut

How?

Innovative Method

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2



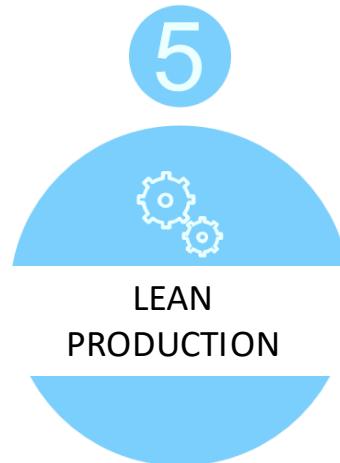
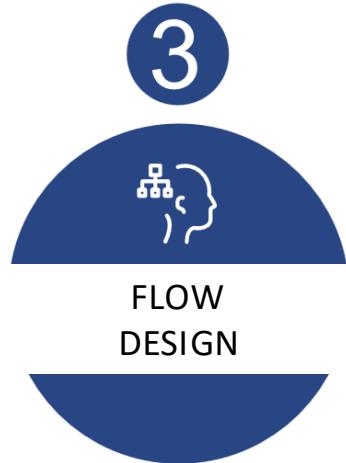
IPD
Integrated Team



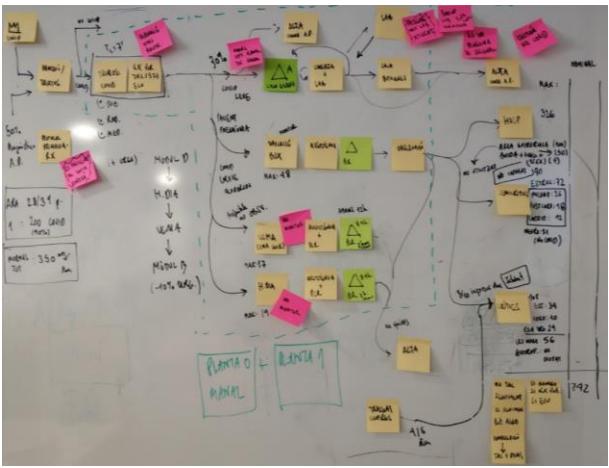
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How?

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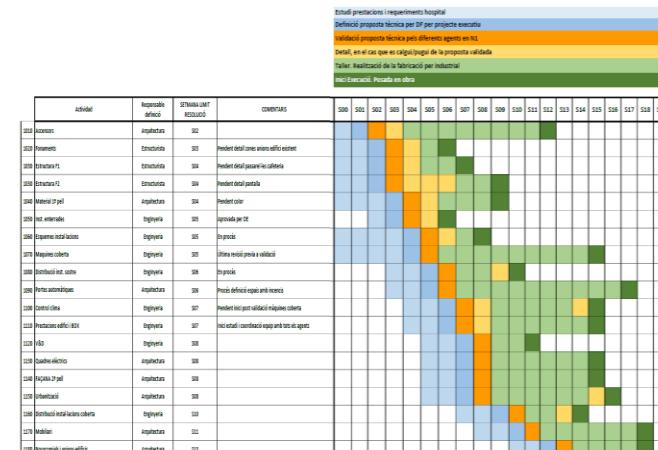
- hospital work
PROCEDURE PLANNING



- Builders and sub-contractors part of the **PLANNING TEAM**

- **Project** based on the **PLANNING**

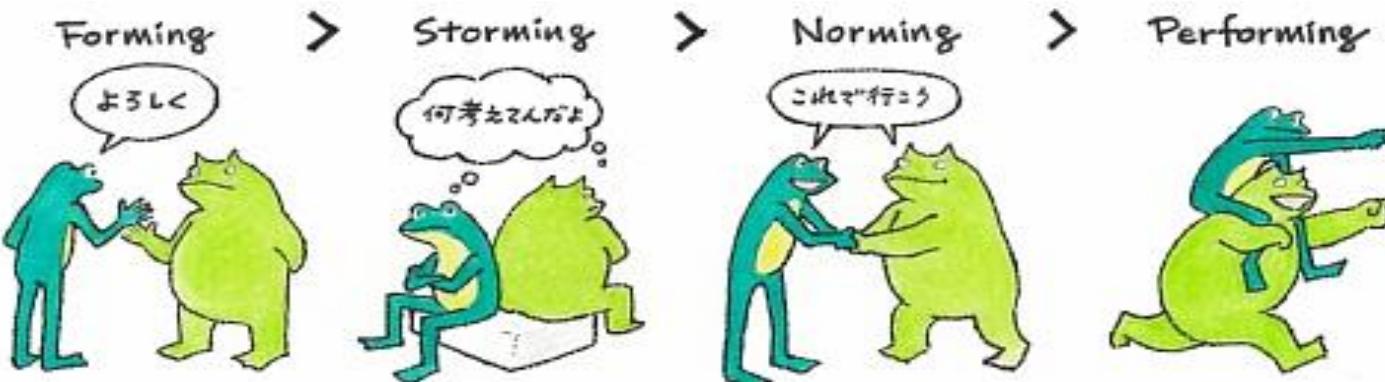
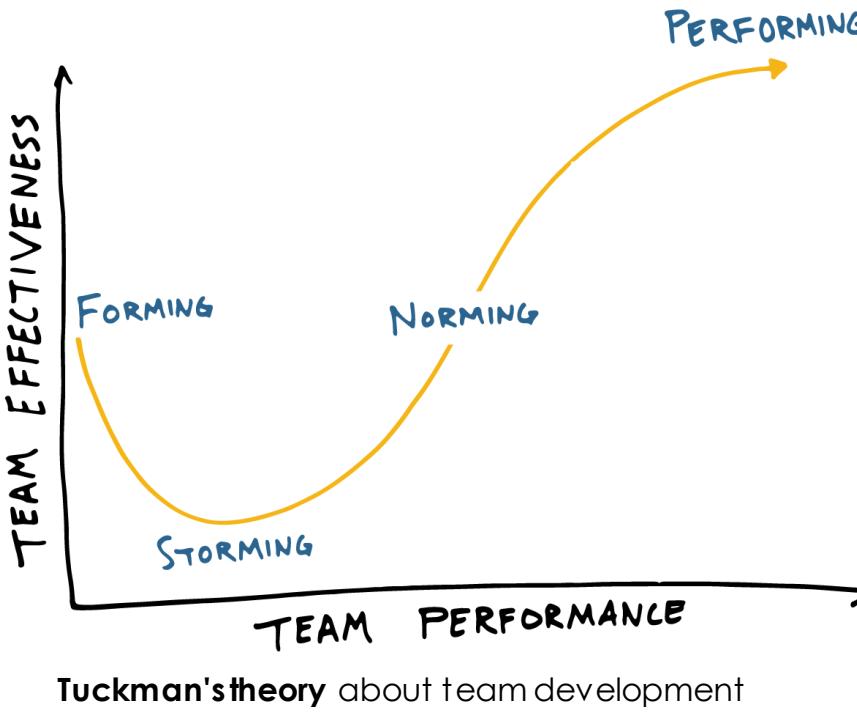
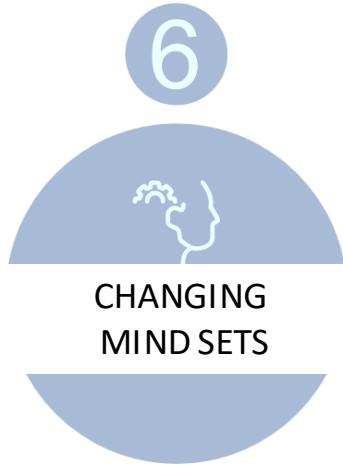
- **PLANNING:**
 - PULL (Long Term)
 - 3 Weeks
 - Weekly**Risks & Restrictions**



/Salut

How?

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Innovative Method

CONFIDENCE

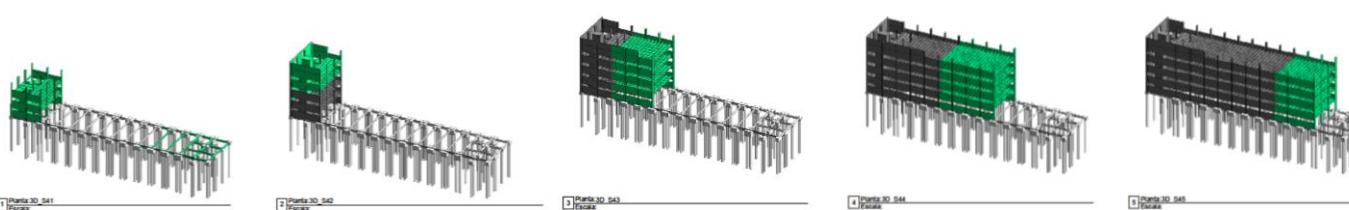
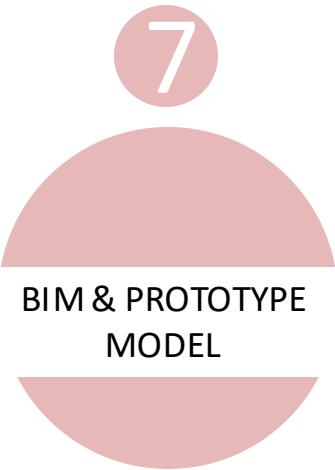
- **People** doing things differently
- **High performance teams** in a few weeks
- **Trust, confidence** the main value
- The intervention of central CatSalut and the Lean Planning Team as the superior **mediation management** body was essential.

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How?

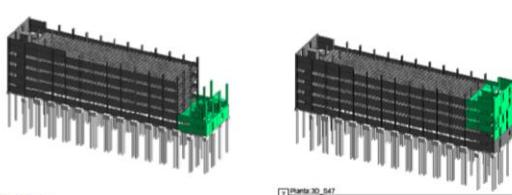
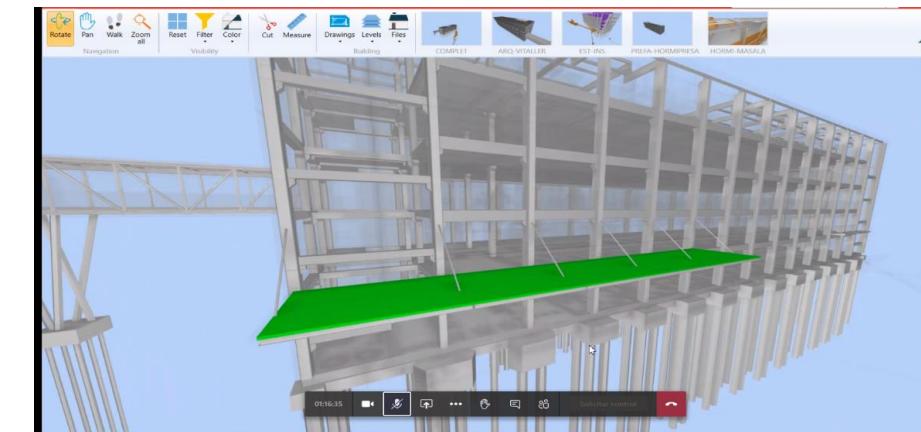
Innovative Method

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BIM / prototyping

- **Design:** understanding space and anticipating risks, collisions
- **Execution:** industrialising solutions, work phases and tasks
- **Maintenance:** big data for future

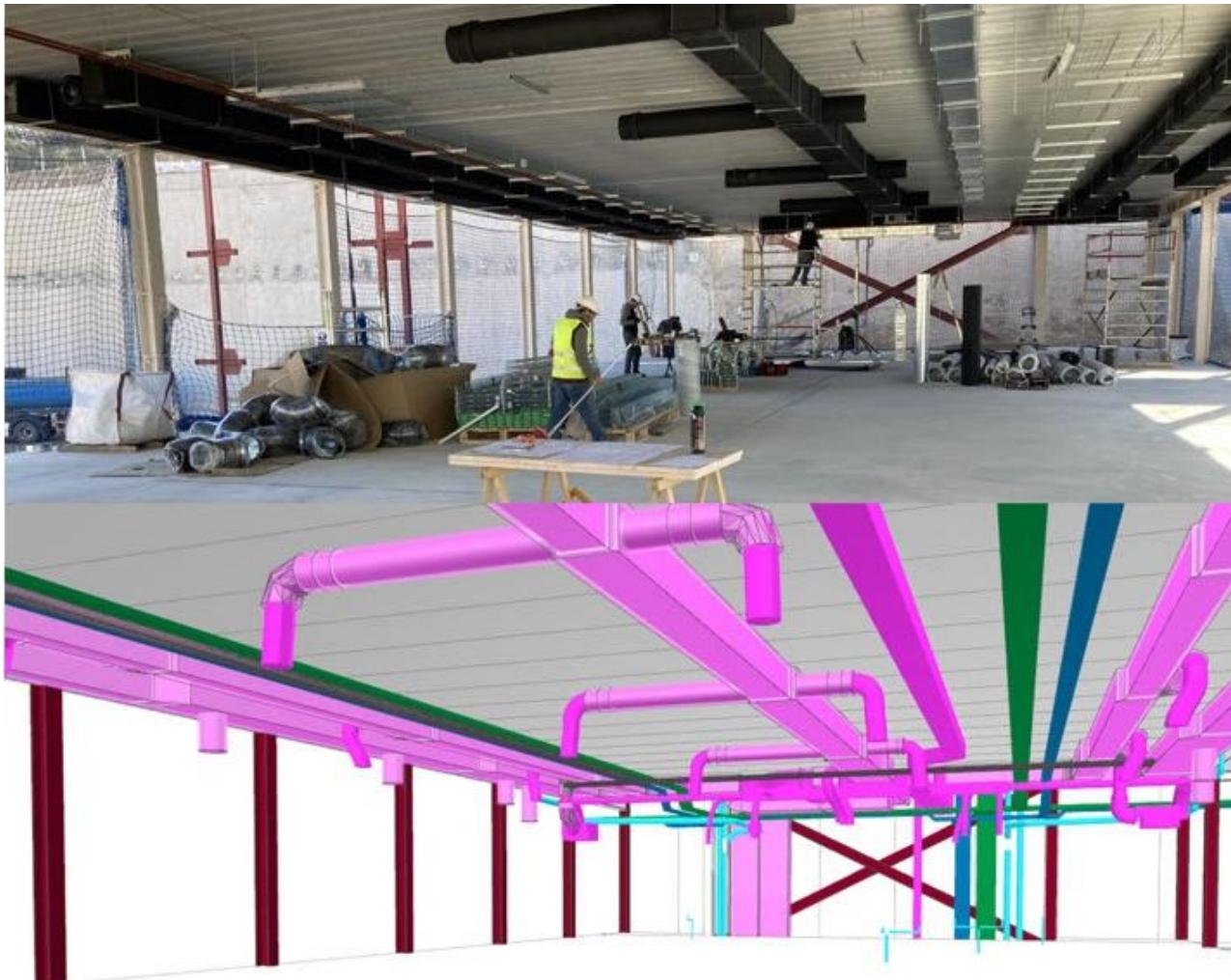


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7 BIM & PROTOTYPE MODEL



Innovative Method

- Common data environment
- Avoid collisions
- Energy simulations
- Economic control
- Work organization
- Workshop construction
- Improvement solutions



/Salut

How?

Innovative Method

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7

BIM & PROTOTYPE
MODEL



Prototype design a real life scale model of the spaces which where to be repeated.

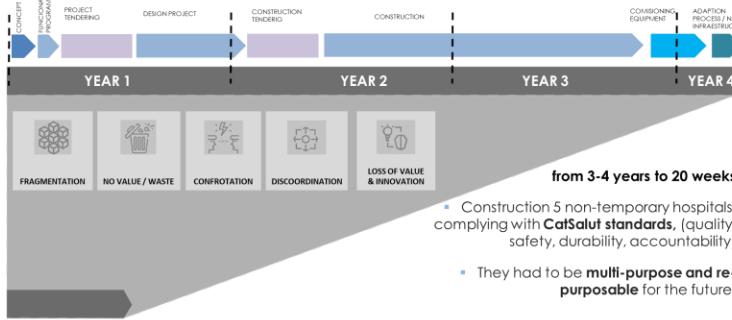
/Salut

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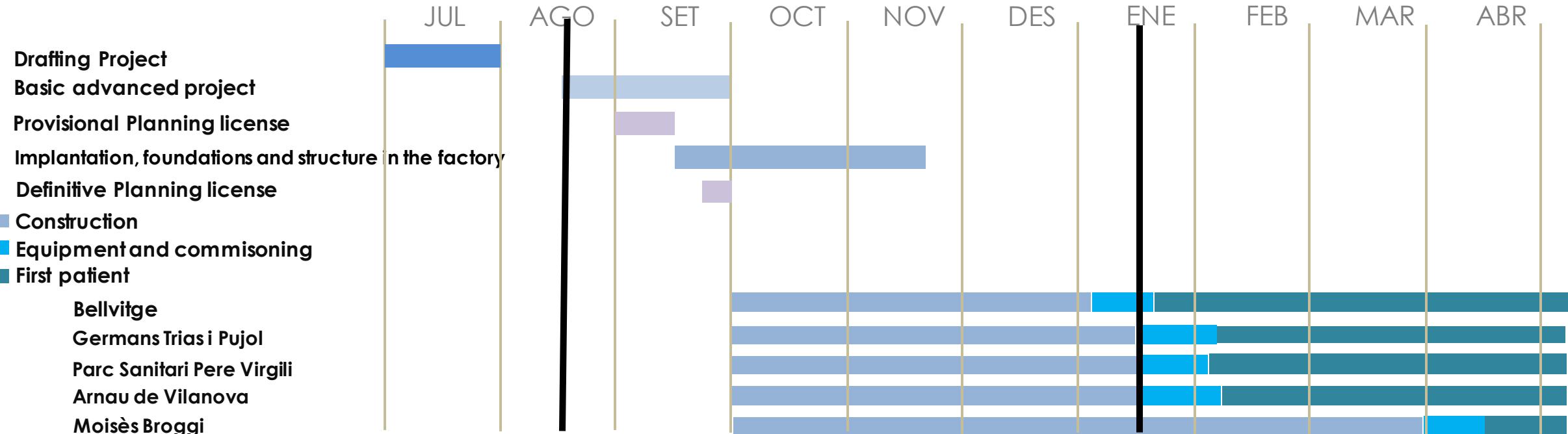
The Multi-purpose Hospital Building Concept Model

MHP timetable



THE CHALLENGE: from 3-4 years to 20 weeks

- Construction 5 non-temporary hospitals, complying with **CatSalut standards**, (quality, safety, durability, accountability)
- They had to be **multi-purpose and re-purposable** for the future.



How?

The Multi-purpose Hospital Building Concept Model

The five multipurpose Hospital Buildings | MHP Arnau de Vilanova | MHP Germans Trias i Pujol | MHP Bellvitge | MHP Moisès Broggi | MHP Parc Sanitari Pere Virgili



Salut/ Servei
Català de la Salut

 Generalitat
de Catalunya

Why? From “*Salut Respira*” to multi-purpose buildings

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Going Forward: MHB Hospital de Sabadell and Granollers

/Salut

Going Forward

The Multipurpose Hospital Building Parc Taulí

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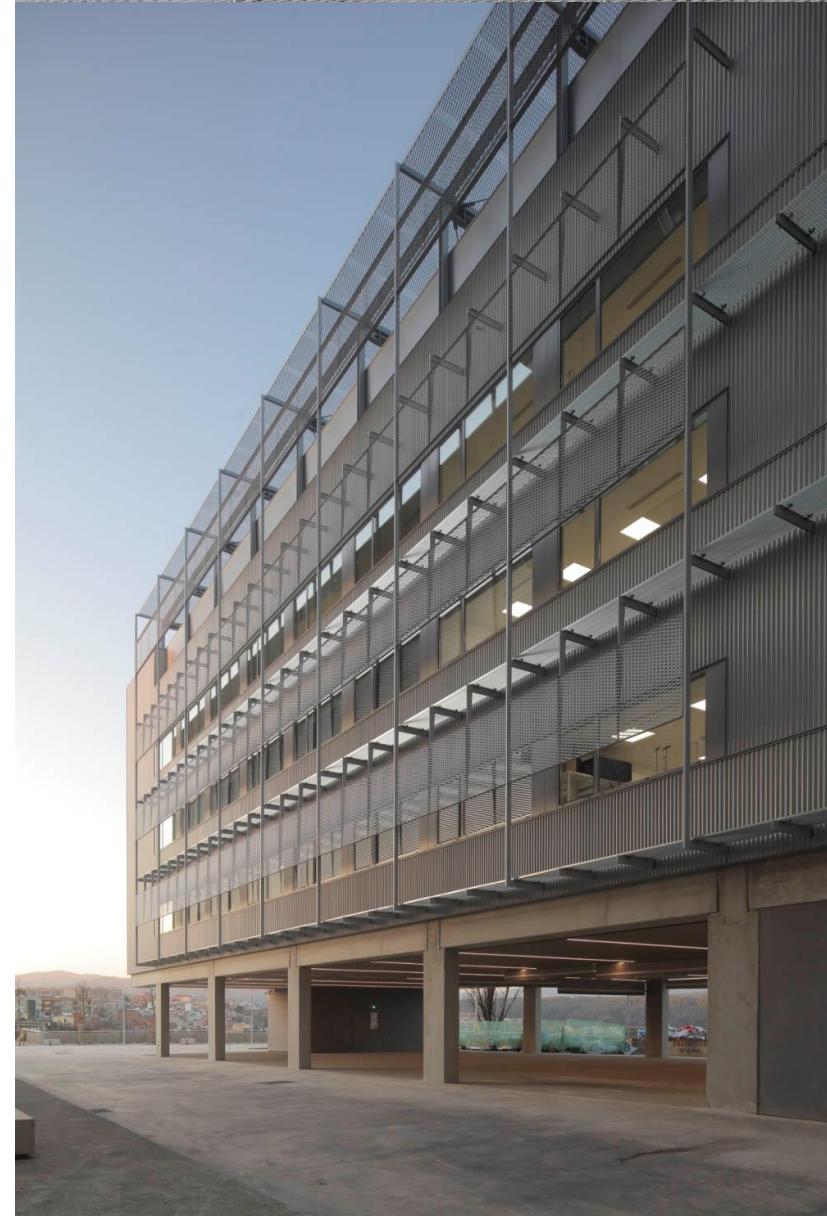
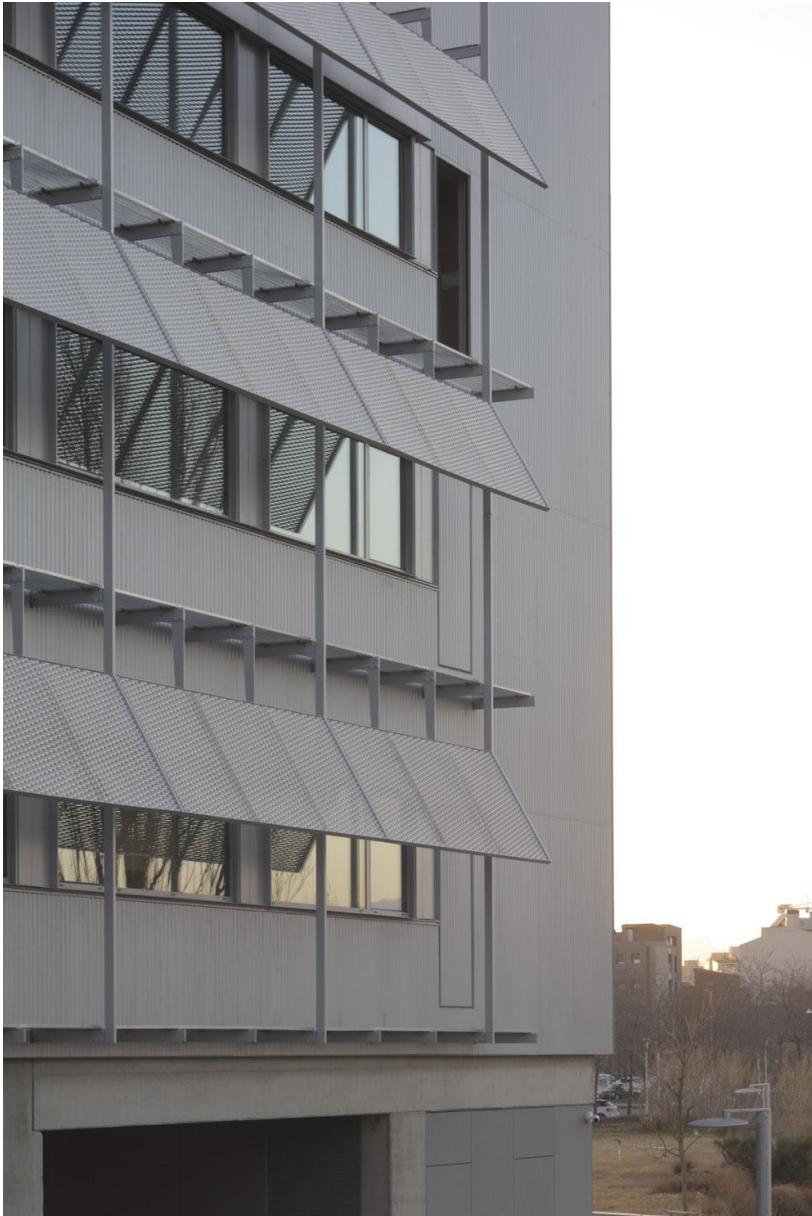


Going Forward

The five multipurpose Hospital Buildings

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The Multipurpose Hospital Building Parc Taulí



Going Forward

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The Multipurpose Hospital Building Parc Taulí

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The Multipurpose Hospital Building Granollers



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ONDR_N

Going Forward

The five multipurpose Hospital Buildings

| MHP Arnau de Vilanova

| MHP Germans Trias i Pujol

| MHP Bellvitge

| MHP Moisès Broggi

| MHP Parc Sàntiau Reire Viroli

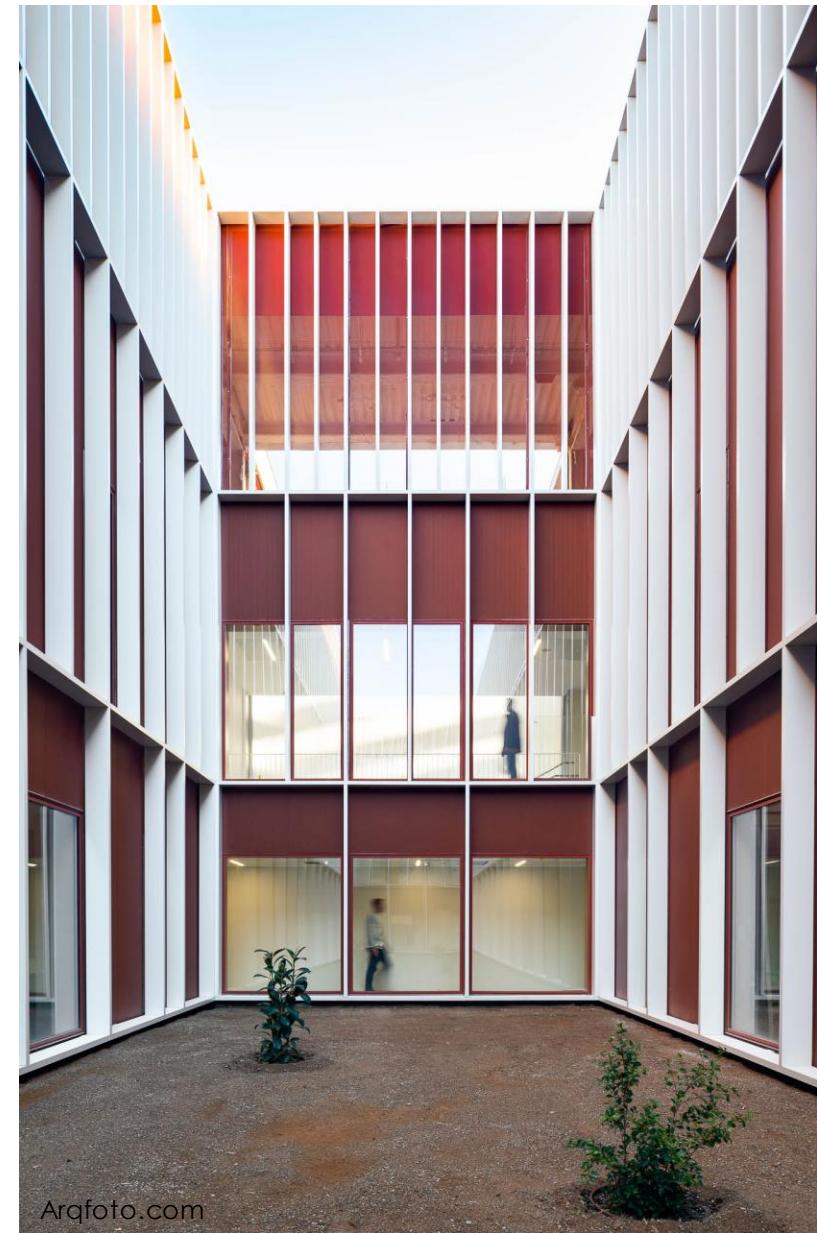
The Multipurpose Hospital Building Granollers



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Going Forward

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Going Forward

The five multipurpose Hospital Buildings

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The Multipurpose Hospital Building Granollers



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Going Forward

The five multipurpose Hospital Buildings

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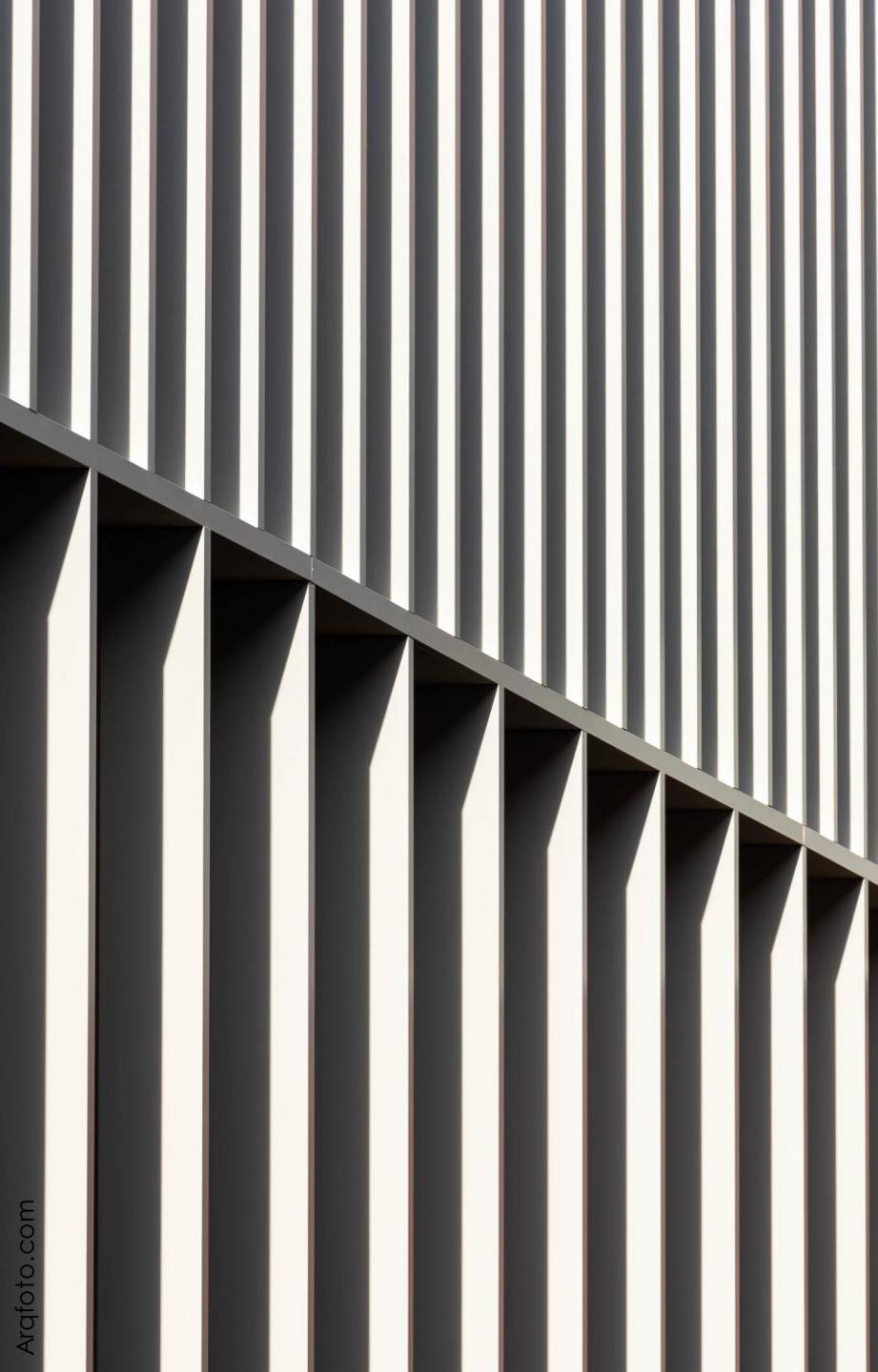
The Multipurpose Hospital Building Granollers

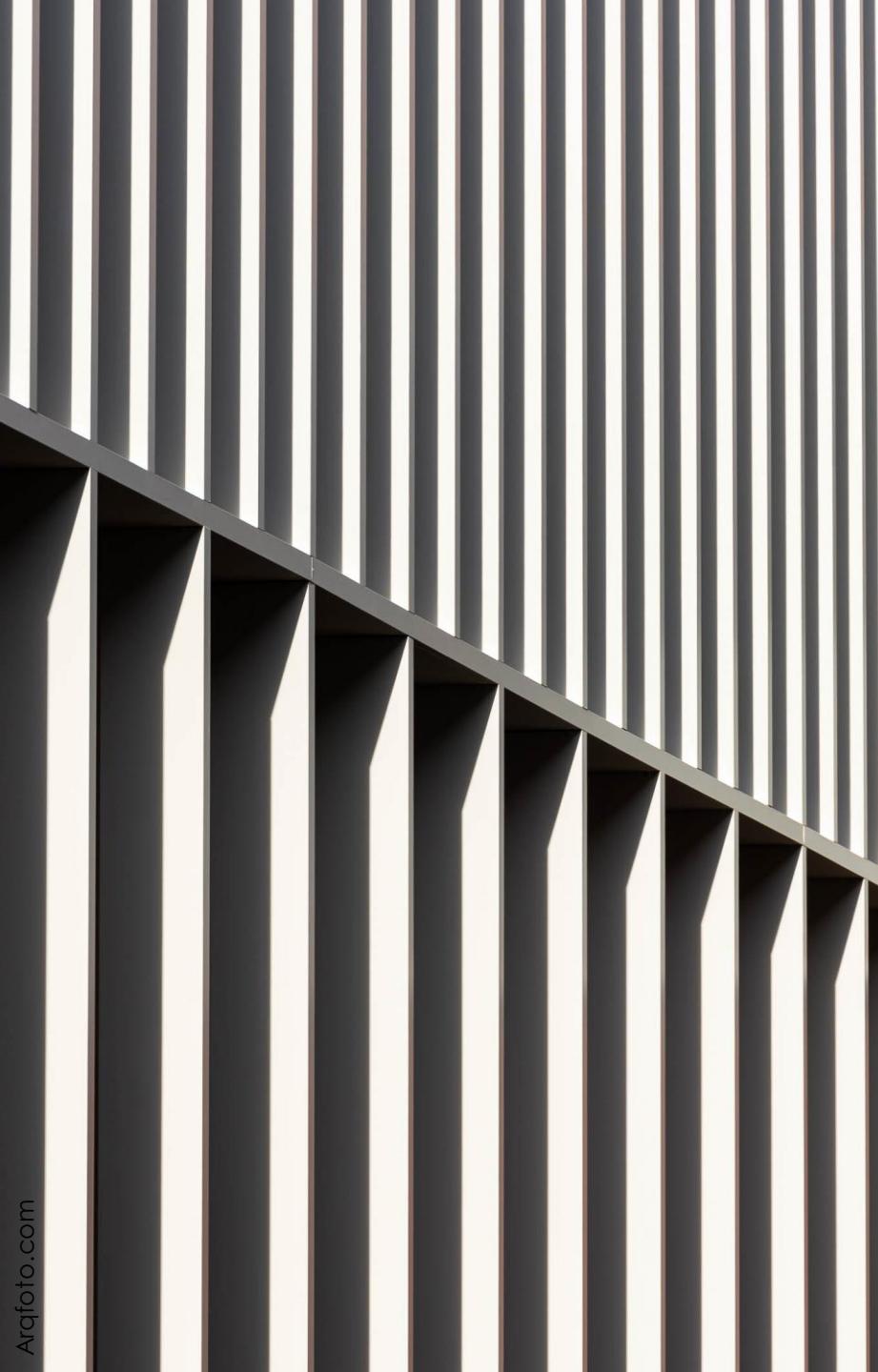


Unitat de
Cures Intensives
Unitat Polivalent



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