

# TIMEPAC

## Academy

### Session 2

## Advantages of creating a BIM model for building renovation

Presenter: Benjamín González Cantó (CYPE)

5 March 2024



REPUBLIC OF SLOVENIA  
MINISTRY OF THE ENVIRONMENT,  
CLIMATE AND ENERGY



EDILCLIMA<sup>®</sup>  
ENGINEERING & SOFTWARE

laSalle

RAMON LLULL UNIVERSITY

SERA

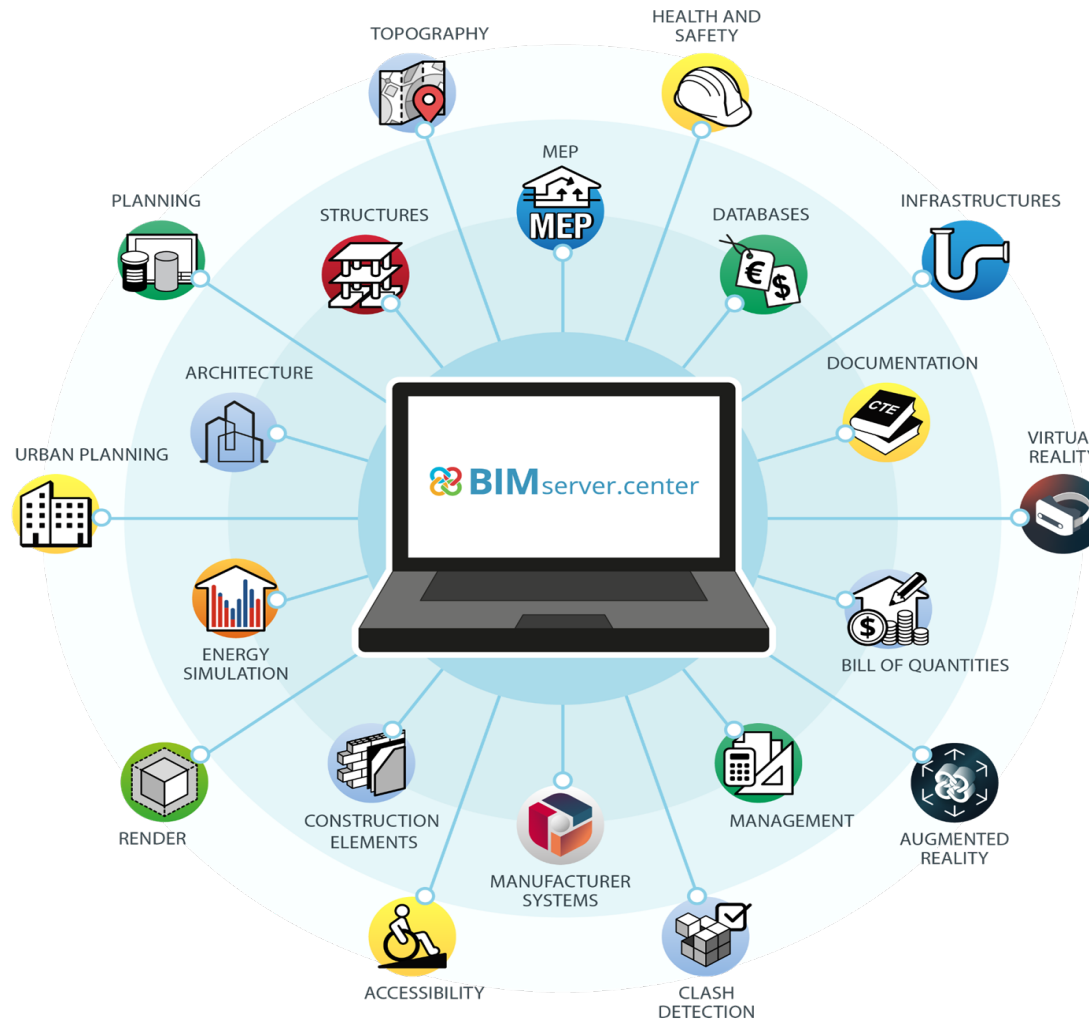
Institute for  
Sustainable Energy and  
Resources Availability

# Advantages of creating a BIM model for building renovation

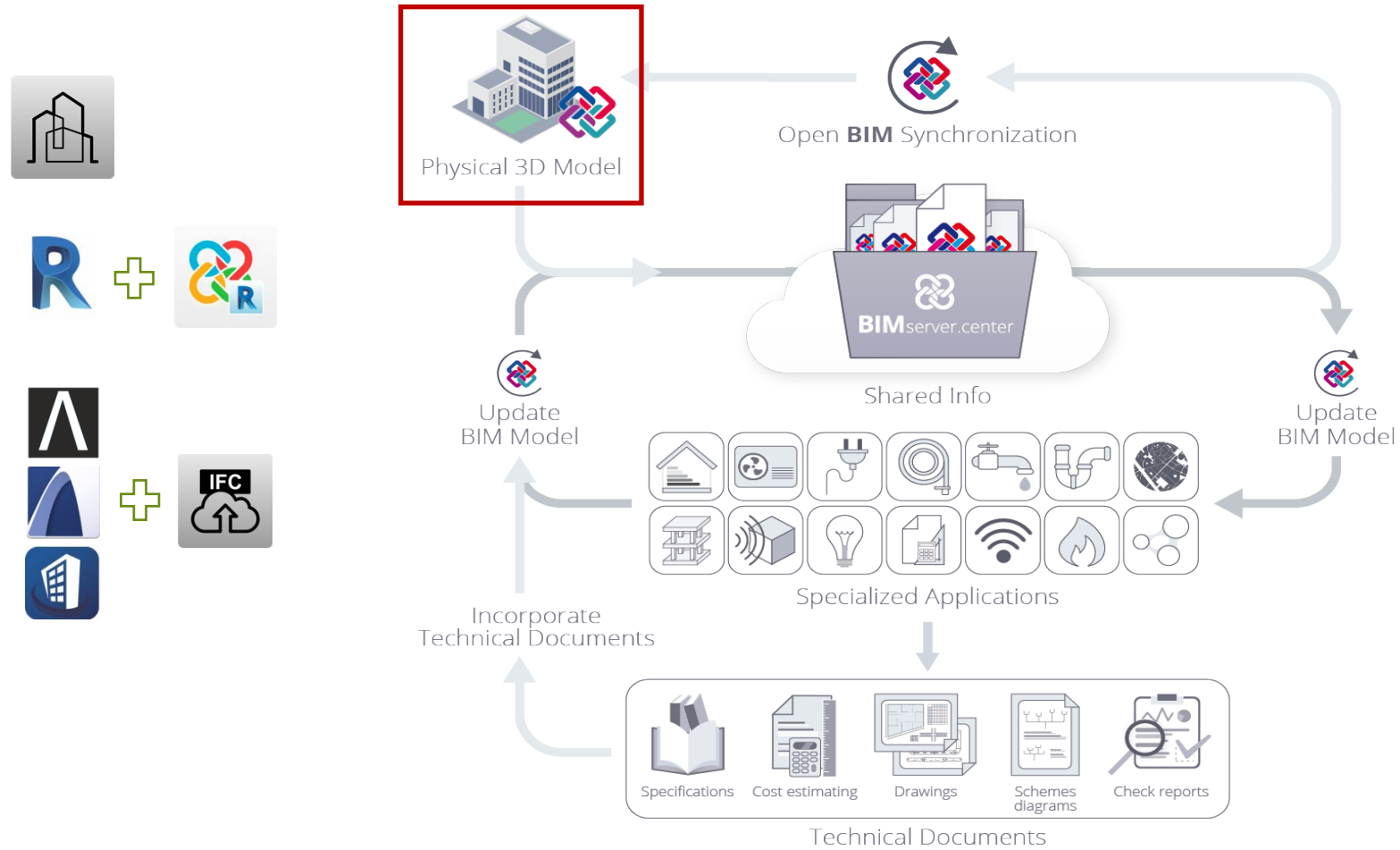
- Collaboration and Coordination
- Accuracy and Quality
- Sustainability
- Budget Management
- Digital Twin

# Collaboration and Coordination

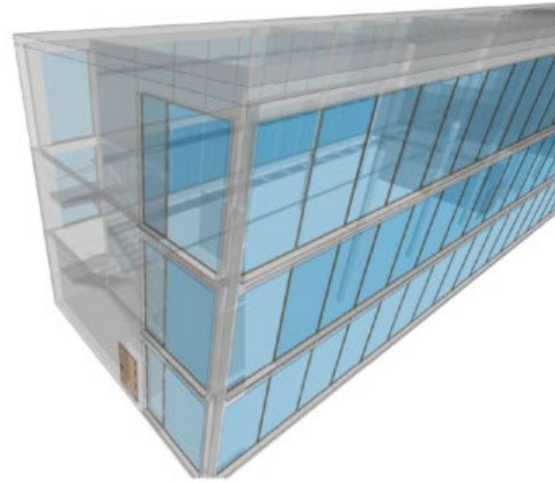
- Architecture
- MEP
- Structures
- Management



# Collaboration and Coordination

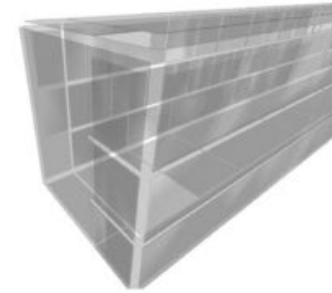


# Accuracy and Quality

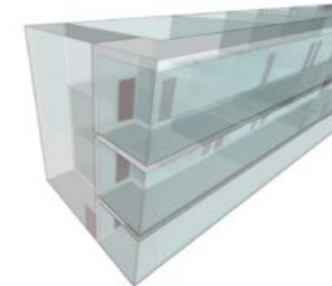


**ARCHITECTURAL MODEL**

**ANALYTICAL MODEL**  
External Surfaces



**ANALYTICAL MODEL**  
Internal Surfaces



**ANALYTICAL MODEL**  
Edges



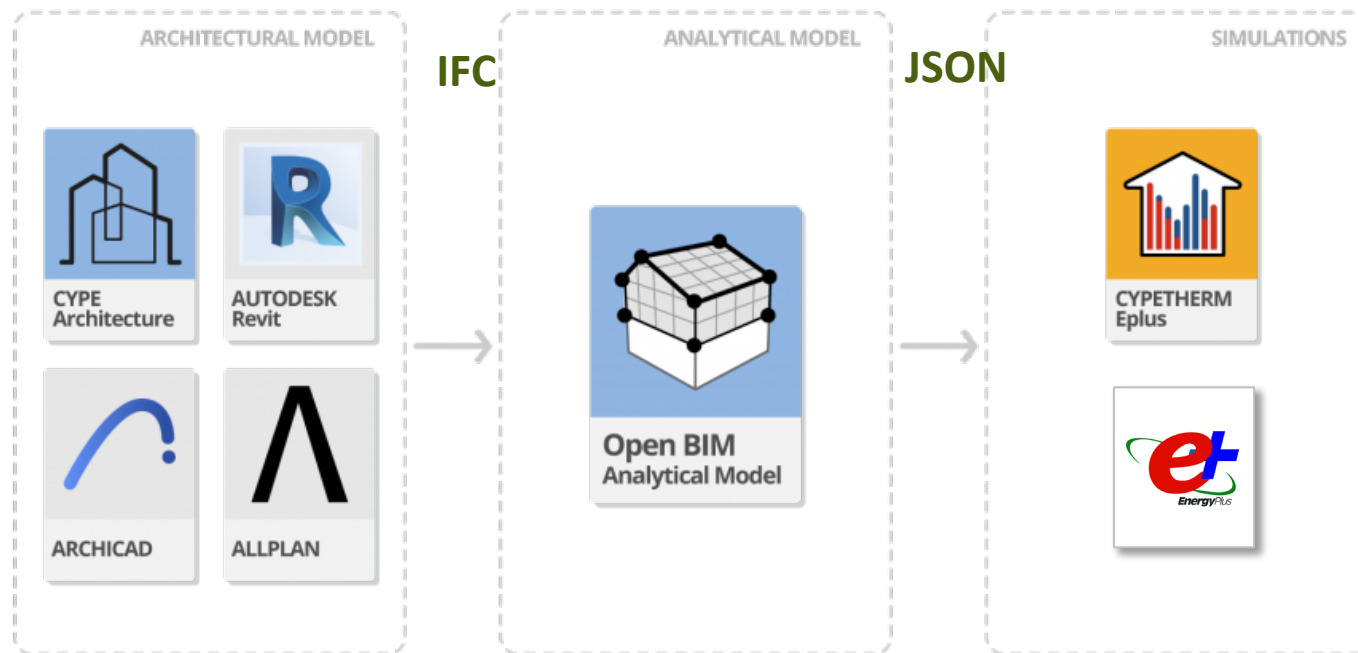
# Accuracy and Quality

Option 1. IFC exchange using BIM tools  
(CYPE Architecture, Revit, Archicad, Allplan,...)

Option 2. IFC exchange using a simulation 3D modeler  
(IFC Builder)

# Accuracy and Quality

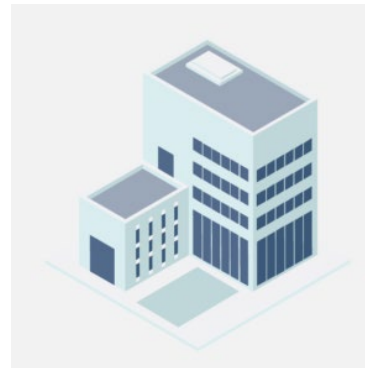
## Open BIM Workflow. Option 1



# Accuracy and Quality

Open BIM Workflow. Option 1

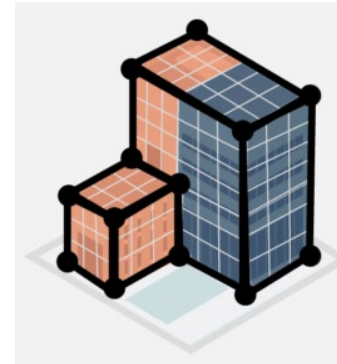
## ARCHITECTURAL MODEL



✓ Walls, floors, windows...

VS

## ANALYTICAL MODEL



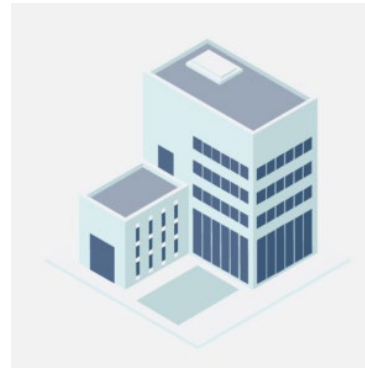
✓ Surfaces, edges, boundaries ...



# Accuracy and Quality

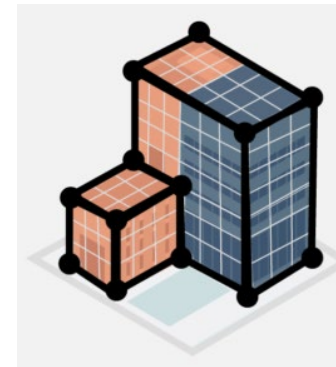
## Open BIM Workflow. Option 1

### ARCHITECTURAL MODEL



✓ Walls, floors, windows...

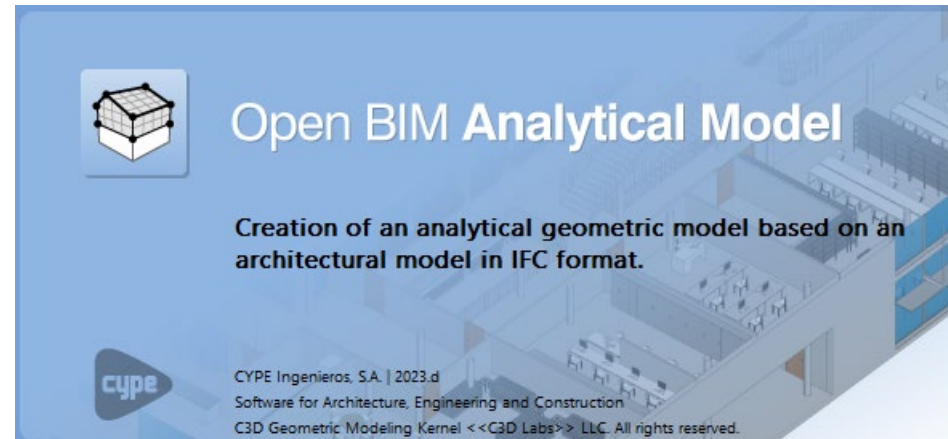
### ANALYTICAL MODEL



✓ Surfaces, edges, boundaries ...

# Accuracy and Quality

## Open BIM Workflow. Option 1

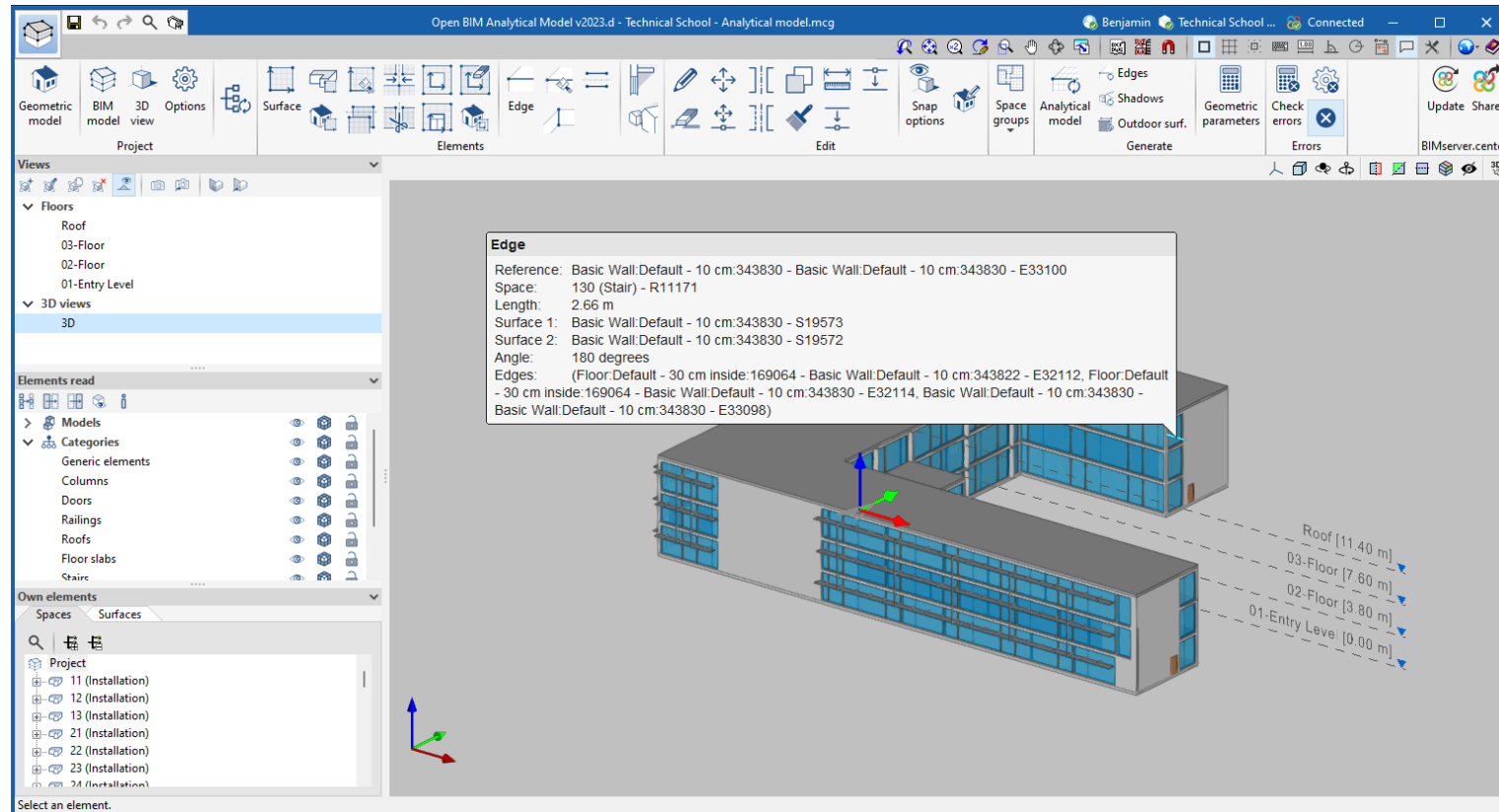


<https://info.cype.com/en/software/open-bim-analytical-model/>

<https://learning.cype.com/en/video/open-bim-analytical-model/>

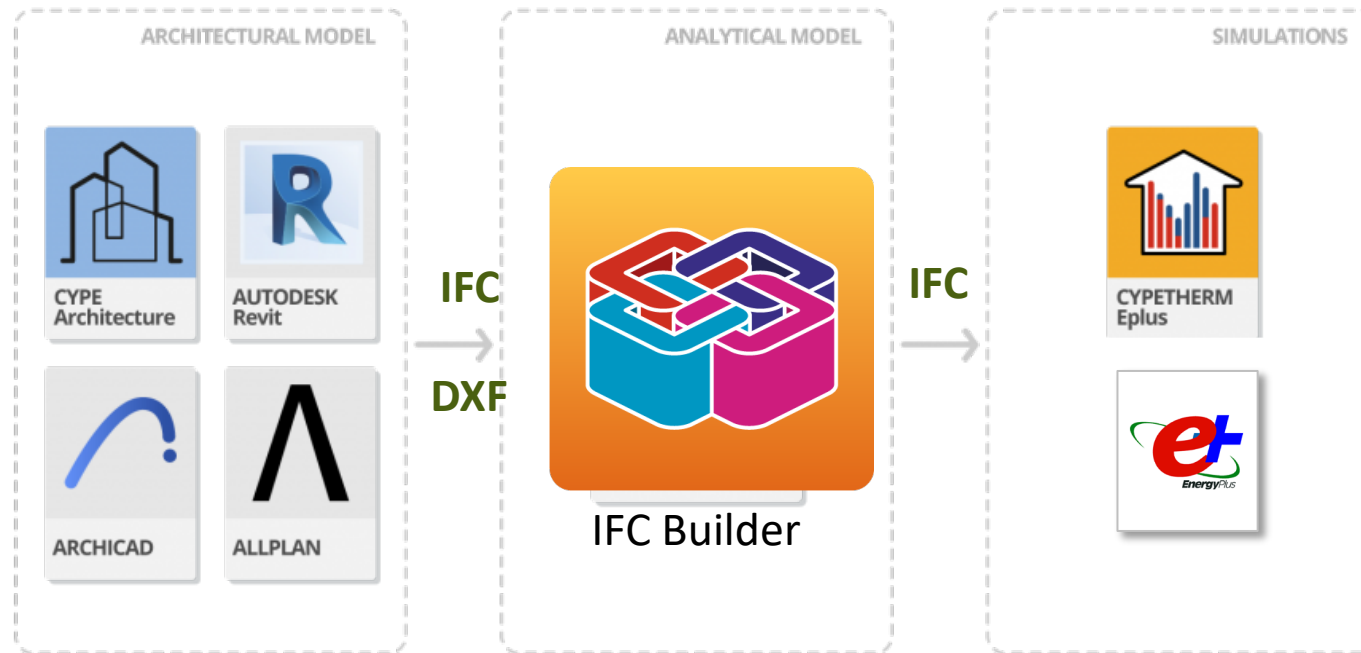
# Accuracy and Quality

## Open BIM Workflow. Option 1



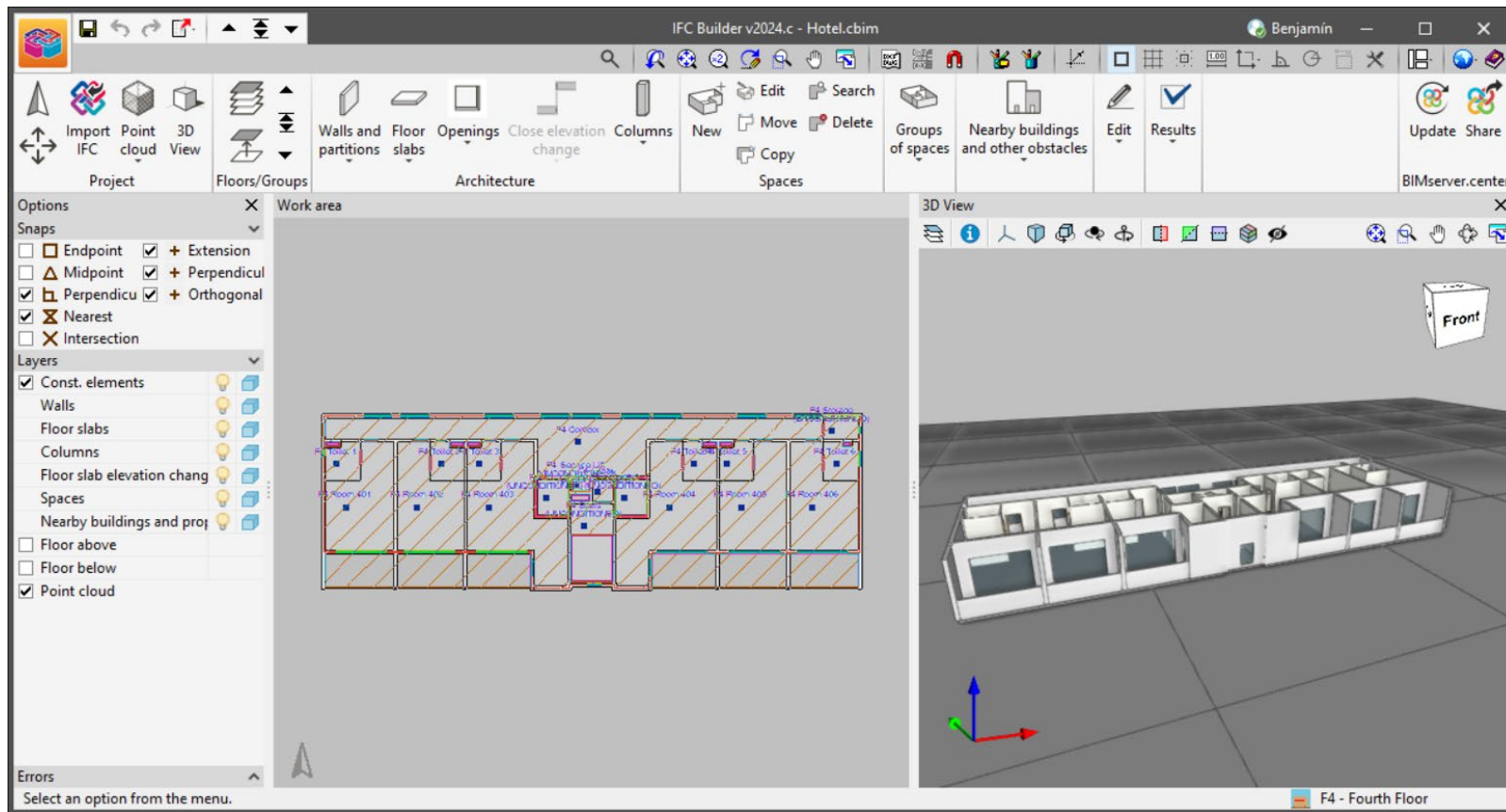
# Accuracy and Quality

Open BIM Workflow. Option 2. IFC Builder



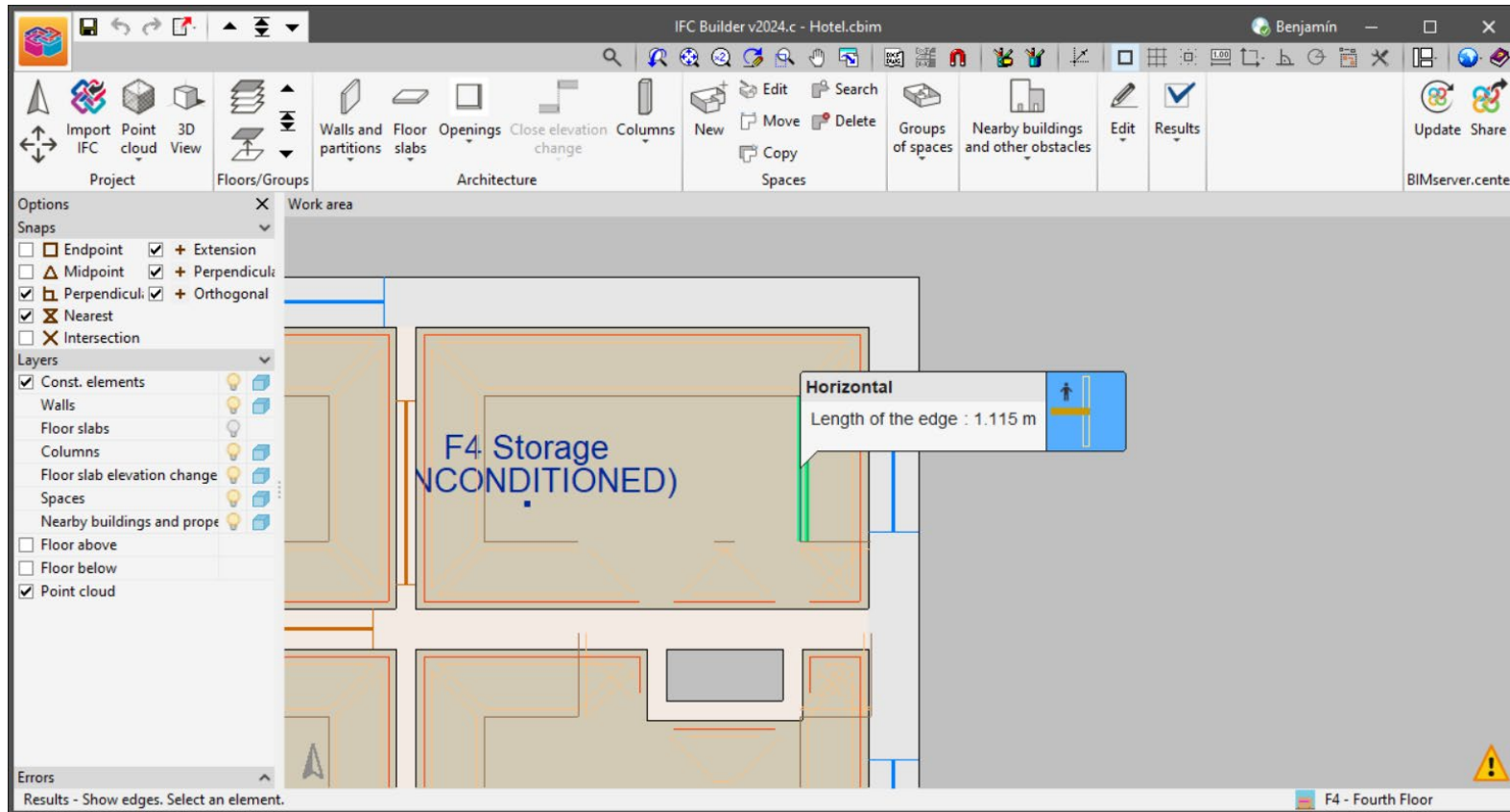
# Accuracy and Quality

## Open BIM Workflow. Option 2. IFC Builder



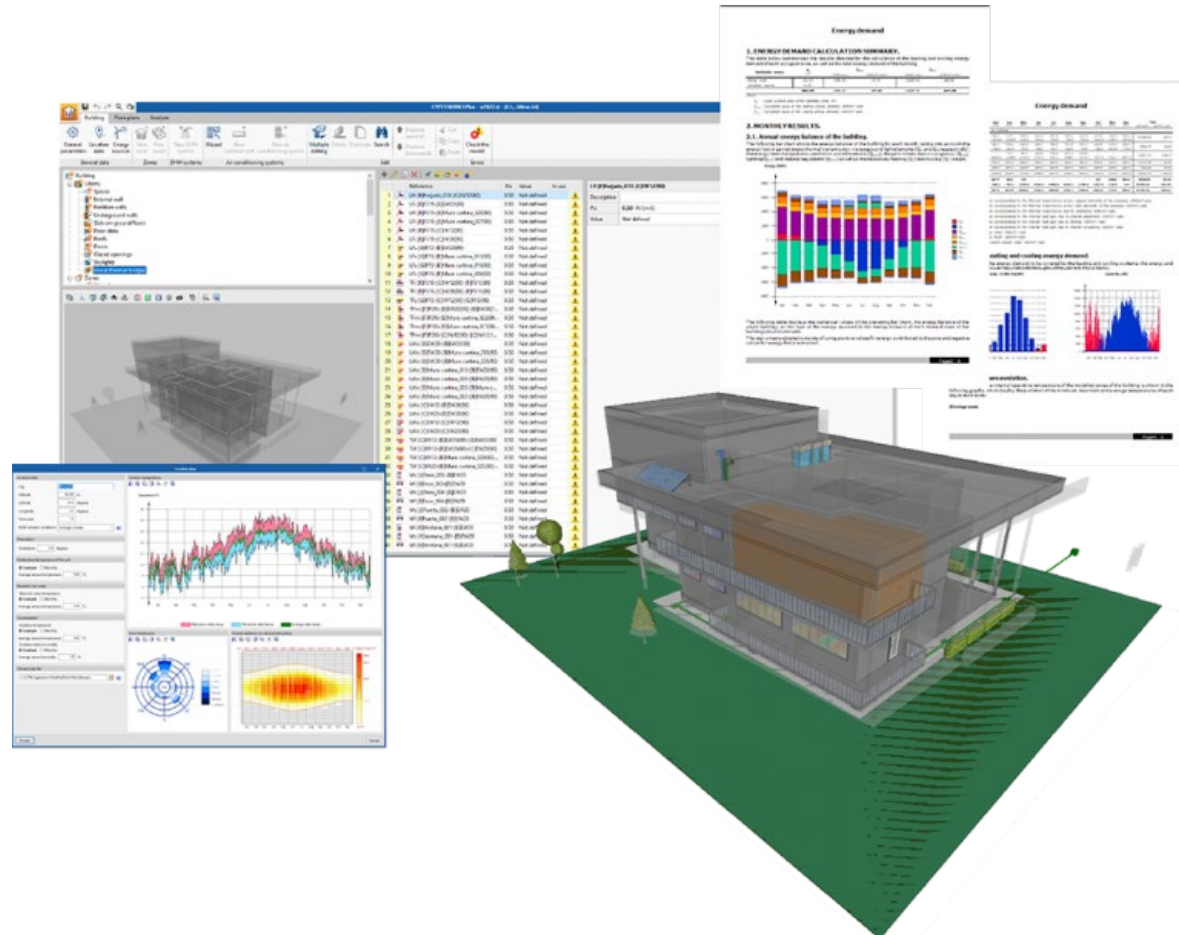
# Accuracy and Quality

## Open BIM Workflow. Option 2. IFC Builder



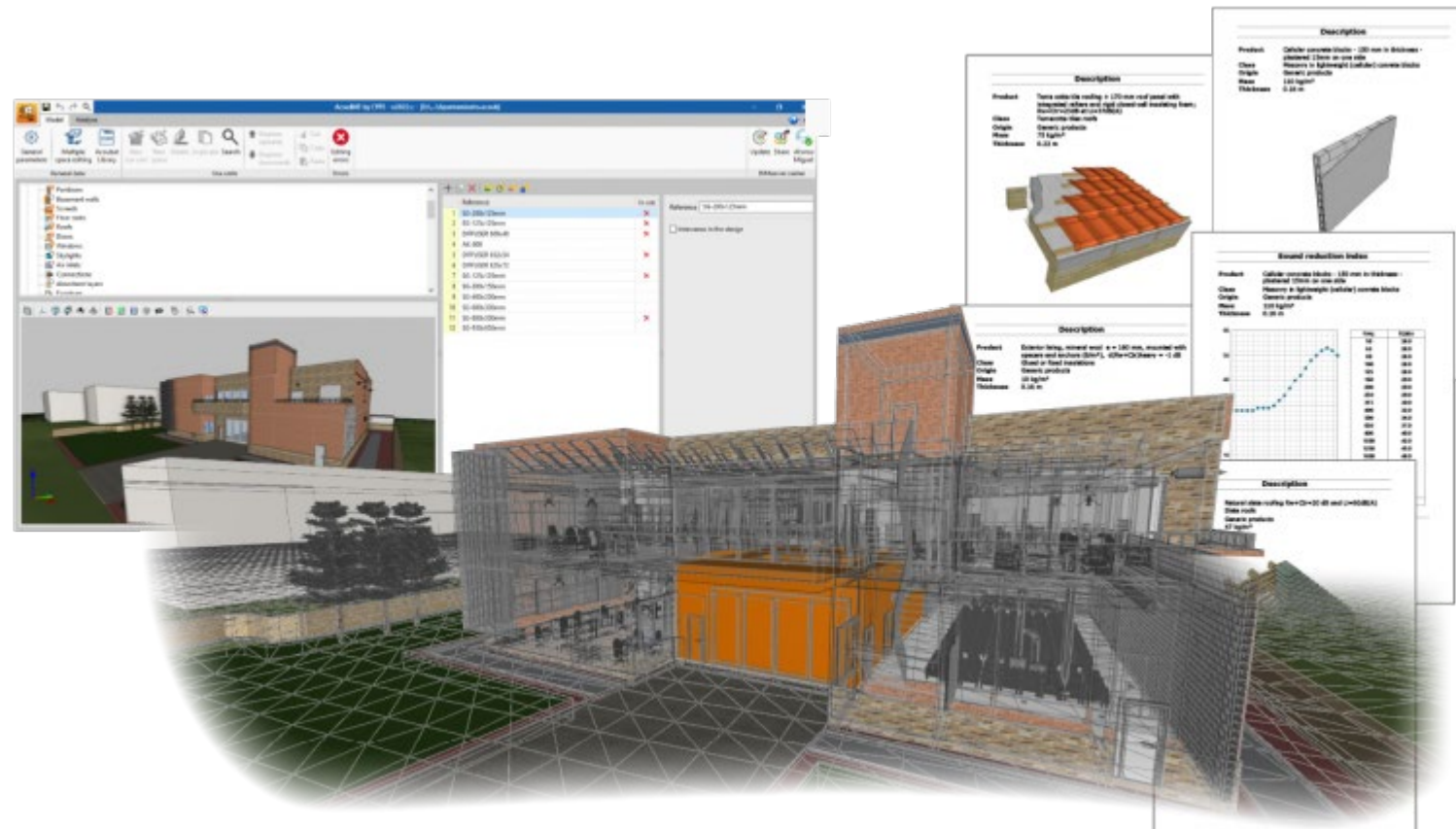
# Accuracy and Quality

Open BIM Workflow. CYPETHERM Eplus



# Accuracy and Quality

## Acoustic design





# Accuracy and Quality

## Acoustic design

**Z01 - ground floor**

**Dining room**  
Type Restaurant  
Volume 171.9 m<sup>3</sup>

Reverberation	Area	Value	Required	Verified
Tr (unfurnished)	207,34 m <sup>2</sup>	1.50 s	Tr ≤ 0.90 s + 0.60	✗
Service equipment noise	Dn,w (dB) C (dB) Ctr (dB) LnAT (dBA)	Required (dBA)	Verified	
Continuous		27	≥ 27	✓

**Hall**  
Type Common Area  
Volume 197.43 m<sup>3</sup>

Reverberation	Area	Value	Required	Verified		
A (unfurnished)	248,32 m <sup>2</sup>	18,90 m <sup>3</sup>	≥ 1,16 m <sup>3</sup>	✓		
Insulation against airborne noise	Area/Length	DnT,w (dB) C (dB) Ctr (dB) D2m,nT,A,Tr (dB)	Required (dB)	Verified		
Dining room	17,24 m <sup>2</sup>	53	-1 -4	52	≥ 45 + 7	✓
Adjacent building	27,96 m <sup>2</sup>	58	-1 -6	57	≥ 40 + 17	✓
Meeting room	33,15 m <sup>2</sup>	63	-1 -7	62	≥ 45 + 17	✓
Office 3	4,74 m <sup>2</sup>	71	-2 -9	69	≥ 45 + 24	✓
Office 4	0,64 m <sup>2</sup>	75	-2 -9	73	≥ 45 + 28	✓
Corridor	13,16 m <sup>2</sup>	69	-2 -8	67	≥ 45 + 22	✓
Impact sound pressure level	Area/Length	L'nT,w (dB)	Required (dB)	Verified		
Dining room		55	≤ 60	-5	✓	

**Office 1**  
Type Protected  
Volume 47.38 m<sup>3</sup>

Insulation against outdoor noise	Area/Length	DnT,w (dB) C (dB) Ctr (dB) D2m,nT,A,Tr (dB)	Required (dB)	Verified		
External	26,41 m <sup>2</sup>	45	-2 -5	40	≥ 30 + 10	✓
Insulation against airborne noise	Area/Length	DnT,w (dB) C (dB) Ctr (dB) DnT,A (dB)	Required (dB)	Verified		
Dining room	9,57 m <sup>2</sup>	63	-2 -8	61	≥ 55 + 6	✓
Z01_S03_W01	9,57 m <sup>2</sup>	63	-2 -8	61		
Hall	95	-3	-10	92		
Office 3	11,45 m <sup>2</sup>	63	-2 -9	61	≥ 50 + 11	✓
Office 4	2,08 m <sup>2</sup>	65	-2 -8	63	≥ 50 + 13	✓
Impact sound pressure level	Area/Length	L'nT,w (dB)	Required (dB)	Verified		
Dining room		59	≤ 60	-1	✓	
Office 3	11,45 m <sup>2</sup>	54	≤ 65	-11	✓	
Office 4	2,08 m <sup>2</sup>	58	≤ 65	-7	✓	
Service equipment noise	Dn,w (dB) C (dB) Ctr (dB) LnAT (dBA)	Required (dBA)	Verified			
Continuous		-18	≥ 27	-45	✓	

**WC gf**  
Type Habitable  
Volume 18.16 m<sup>3</sup>

Insulation against airborne noise	Area/Length	DnT,w (dB) C (dB) Ctr (dB) DnT,A (dB)	Required (dB)	Verified		
Dining room	13,01 m <sup>2</sup>	53	-1 -7	52	≥ 45 + 7	✓
Z01_S04_W04	3,04 m <sup>2</sup>	64	-3 -11	61		
Z01_S04_W01	9,97 m <sup>2</sup>	54	-2 -7	52		
Hall		89	-3 -9	86		
Adjacent building	6,20 m <sup>2</sup>	51	-2 -7	49	≥ 40 + 9	✓
WC 1f	5,34 m <sup>2</sup>	59	-1 -6	58	≥ 45 + 13	✓
Impact sound pressure level	Area/Length	L'nT,w (dB)	Required (dB)	Verified		
Dining room		64	≤ 60	+ 4	✗	

**Z01 - ground floor**

**Dining room**  
Type Restaurant  
Volume 171.9 m<sup>3</sup>

Reverberation	Area	Value	Required	Verified
Tr (unfurnished)	207,34 m <sup>2</sup>	1.50 s	Tr ≤ 0.90 s + 0.60	✗
Service equipment noise	Dn,w (dB) C (dB) Ctr (dB) LnAT (dBA)	Required (dBA)	Verified	
Continuous		27	≥ 27	✓

**Hall**  
Type Common Area  
Volume 197.43 m<sup>3</sup>

Reverberation	Area	Value	Required	Verified		
A (unfurnished)	248,32 m <sup>2</sup>	18,90 m <sup>3</sup>	≥ 1,16 m <sup>3</sup>	✓		
Insulation against airborne noise	Area/Length	DnT,w (dB) C (dB) Ctr (dB) D2m,nT,A,Tr (dB)	Required (dB)	Verified		
Dining room	17,24 m <sup>2</sup>	53	-1 -4	52	≥ 45 + 7	✓
Adjacent building	27,96 m <sup>2</sup>	58	-1 -6	57	≥ 40 + 17	✓
Meeting room	33,15 m <sup>2</sup>	63	-1 -7	62	≥ 45 + 17	✓
Office 3	4,74 m <sup>2</sup>	71	-2 -9	69	≥ 45 + 24	✓
Office 4	0,64 m <sup>2</sup>	75	-2 -9	73	≥ 45 + 28	✓
Corridor	13,16 m <sup>2</sup>	69	-2 -8	67	≥ 45 + 22	✓
Impact sound pressure level	Area/Length	L'nT,w (dB)	Required (dB)	Verified		
Dining room		55	≤ 60	-5	✓	

**Office 1**  
Type Protected  
Volume 47.38 m<sup>3</sup>

Insulation against outdoor noise	Area/Length	DnT,w (dB) C (dB) Ctr (dB) D2m,nT,A,Tr (dB)	Required (dB)	Verified		
External	26,41 m <sup>2</sup>	45	-2 -5	40	≥ 30 + 10	✓
Insulation against airborne noise	Area/Length	DnT,w (dB) C (dB) Ctr (dB) DnT,A (dB)	Required (dB)	Verified		
Dining room	9,57 m <sup>2</sup>	63	-2 -8	61	≥ 55 + 6	✓
Z01_S03_W01	9,57 m <sup>2</sup>	63	-2 -8	61		
Hall		95	-3	-10	92	
Office 3	11,45 m <sup>2</sup>	63	-2 -9	61	≥ 50 + 11	✓
Office 4	2,08 m <sup>2</sup>	65	-2 -8	63	≥ 50 + 13	✓
Impact sound pressure level	Area/Length	L'nT,w (dB)	Required (dB)	Verified		
Dining room		59	≤ 60	-1	✓	
Office 3	11,45 m <sup>2</sup>	54	≤ 65	-11	✓	
Office 4	2,08 m <sup>2</sup>	58	≤ 65	-7	✓	
Service equipment noise	Dn,w (dB) C (dB) Ctr (dB) LnAT (dBA)	Required (dBA)	Verified			
Continuous		-18	≥ 27	-45	✓	

**WC gf**  
Type Habitable  
Volume 18.16 m<sup>3</sup>

Insulation against airborne noise	Area/Length	DnT,w (dB) C (dB) Ctr (dB) DnT,A (dB)	Required (dB)	Verified		
Dining room	13,01 m <sup>2</sup>	53	-1 -7	52	≥ 45 + 7	✓
Z01_S04_W04	3,04 m <sup>2</sup>	64	-3 -11	61		
Z01_S04_W01	9,97 m <sup>2</sup>	54	-2 -7	52		
Hall		89	-3 -9	86		
Adjacent building	6,20 m <sup>2</sup>	51	-2 -7	49	≥ 40 + 9	✓
WC 1f	5,34 m <sup>2</sup>	59	-1 -6	58	≥ 45 + 13	✓
Impact sound pressure level	Area/Length	L'nT,w (dB)	Required (dB)	Verified		
Dining room		64	≤ 60	+ 4	✗	

**Materials list**

English Date: 02/20/18

**1.- FAÇADES**

**1.1.- Brick wall 13 (457.9 m<sup>2</sup>)**

Base element	
Product	COETHERM Pumise stone blocks 200 mm in thickness with 15 mm cement mortar on one side
Class	Masonry in Hollow concrete block
Origin	COEBLOC
Mass	215 kg/m <sup>3</sup>
Thickness	0,22 m

**Internal cover**

Internal cover	
Product	Interior cladding ISOCOMBO 140; dRw,heavy =14dB
Class	Wall lining with cellular foam
Origin	UNILIN-BVBA
Mass	14 kg/m <sup>3</sup>
Thickness	0,17 m

**1.2.- Brick wall 17 (159.12 m<sup>2</sup>)**

Base element	
Product	Concrete 17 cm
Class	Solid concrete
Origin	Traditional products
Mass	400 kg/m <sup>3</sup>
Thickness	0,17 m

**1.3.- Defence (29.44 m<sup>2</sup>)**

Base element	
Product	Concrete 20 cm
Class	Solid concrete
Origin	Traditional products
Mass	470 kg/m <sup>3</sup>
Thickness	0,2 m

**2.- PARTITIONS**

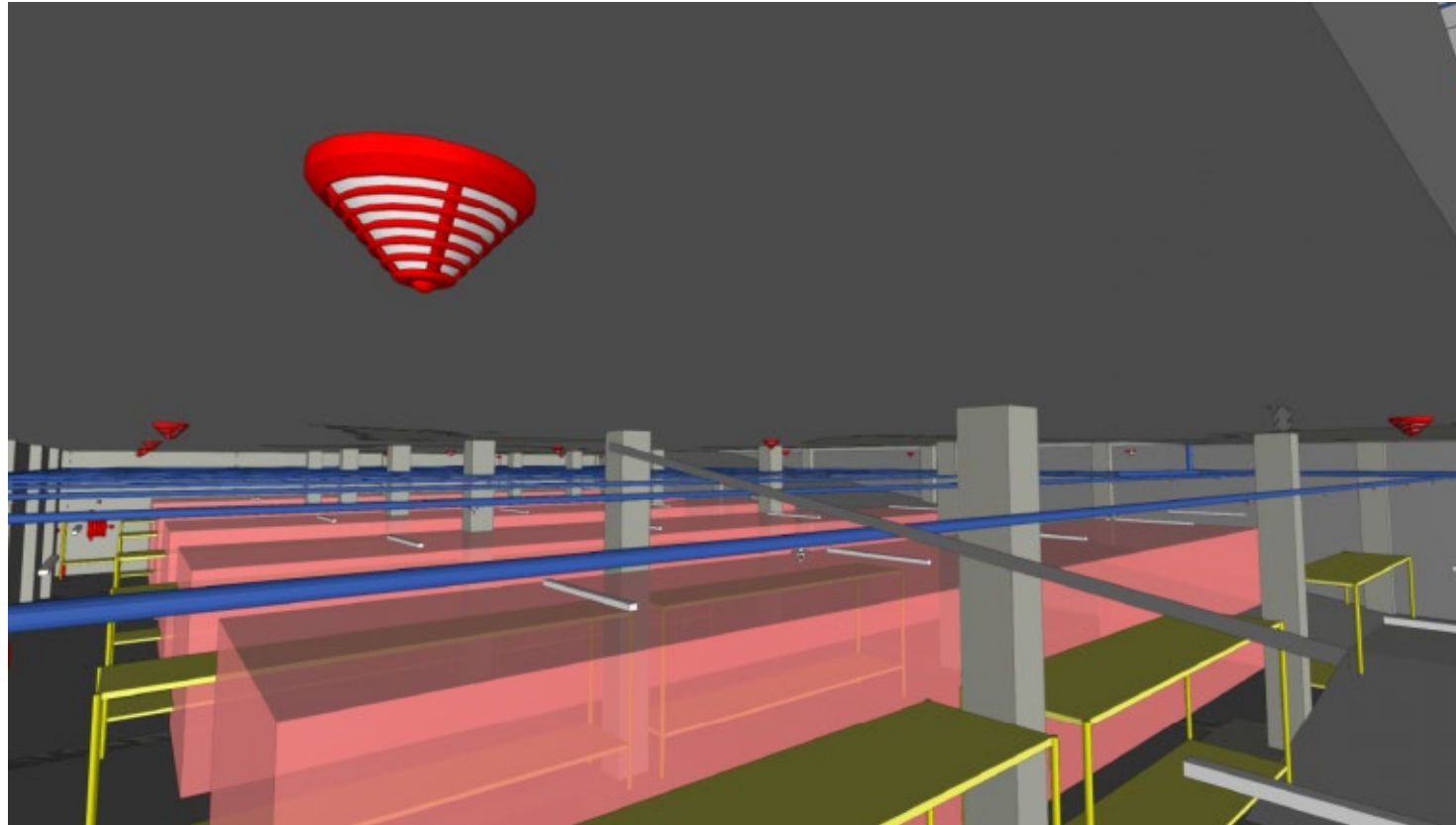
**2.1.- Isolated partition (121.22 m<sup>2</sup>)**

Base element	
Product	Partition wall 120/70 with FERMACELL boards thickness 12.5 mm filled with ROCKCALM 60 mm
Class	Single frame dry partition wall
Origin	ROCKWOOL
Mass	62 kg/m <sup>3</sup>
Thickness	0,12 m

Page 2

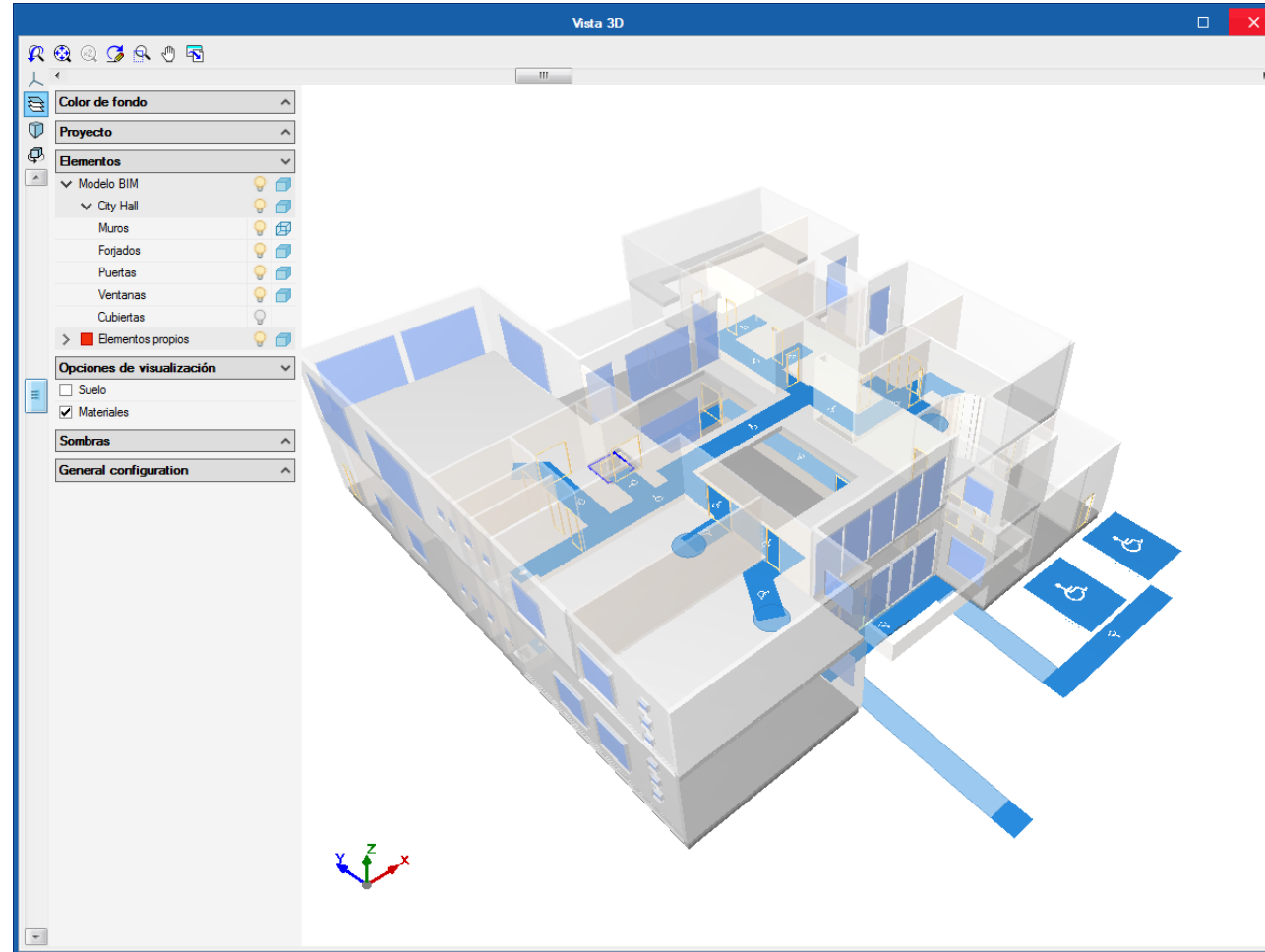
# Accuracy and Quality

Fire design



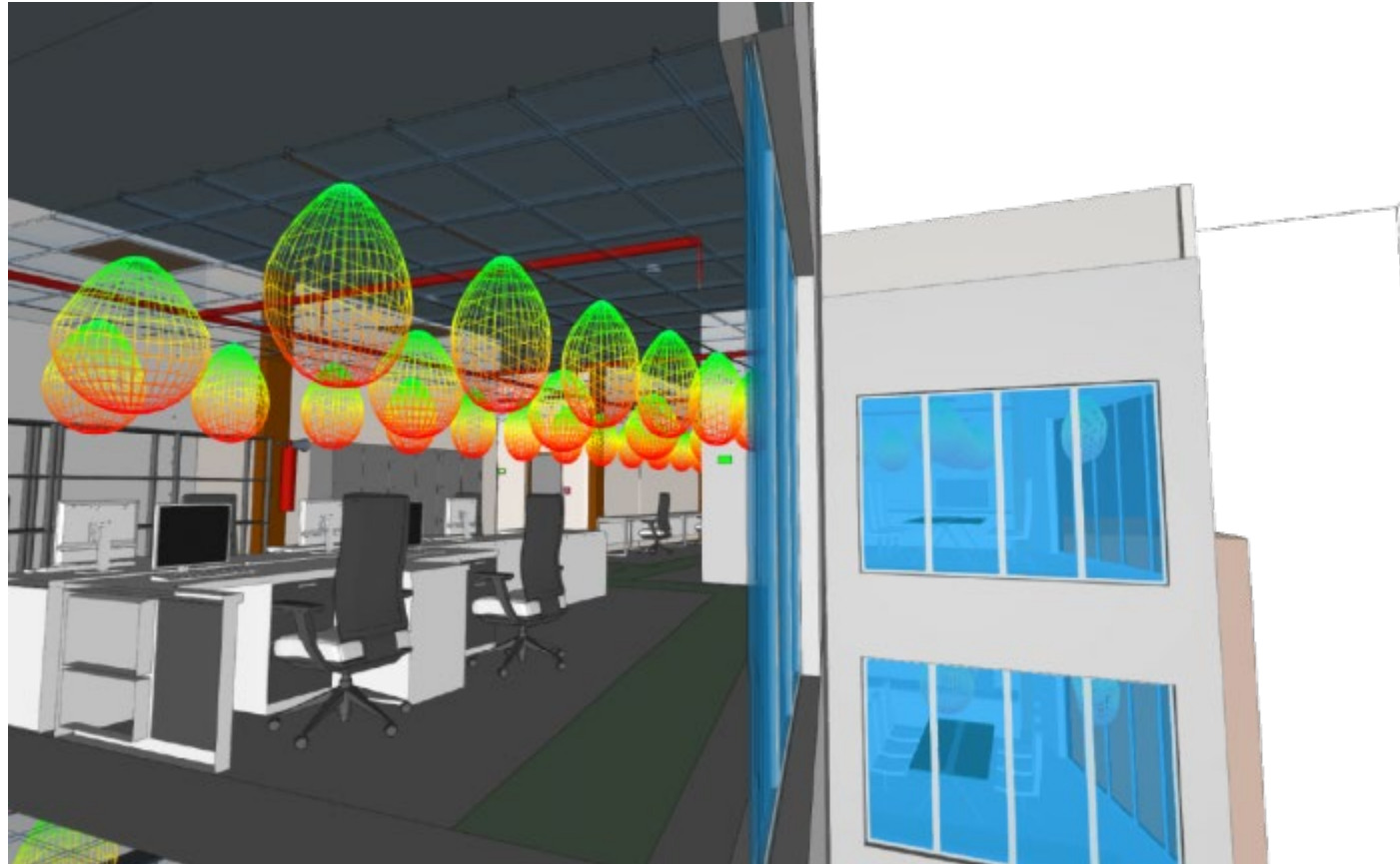
# Accuracy and Quality

## Accessibility design



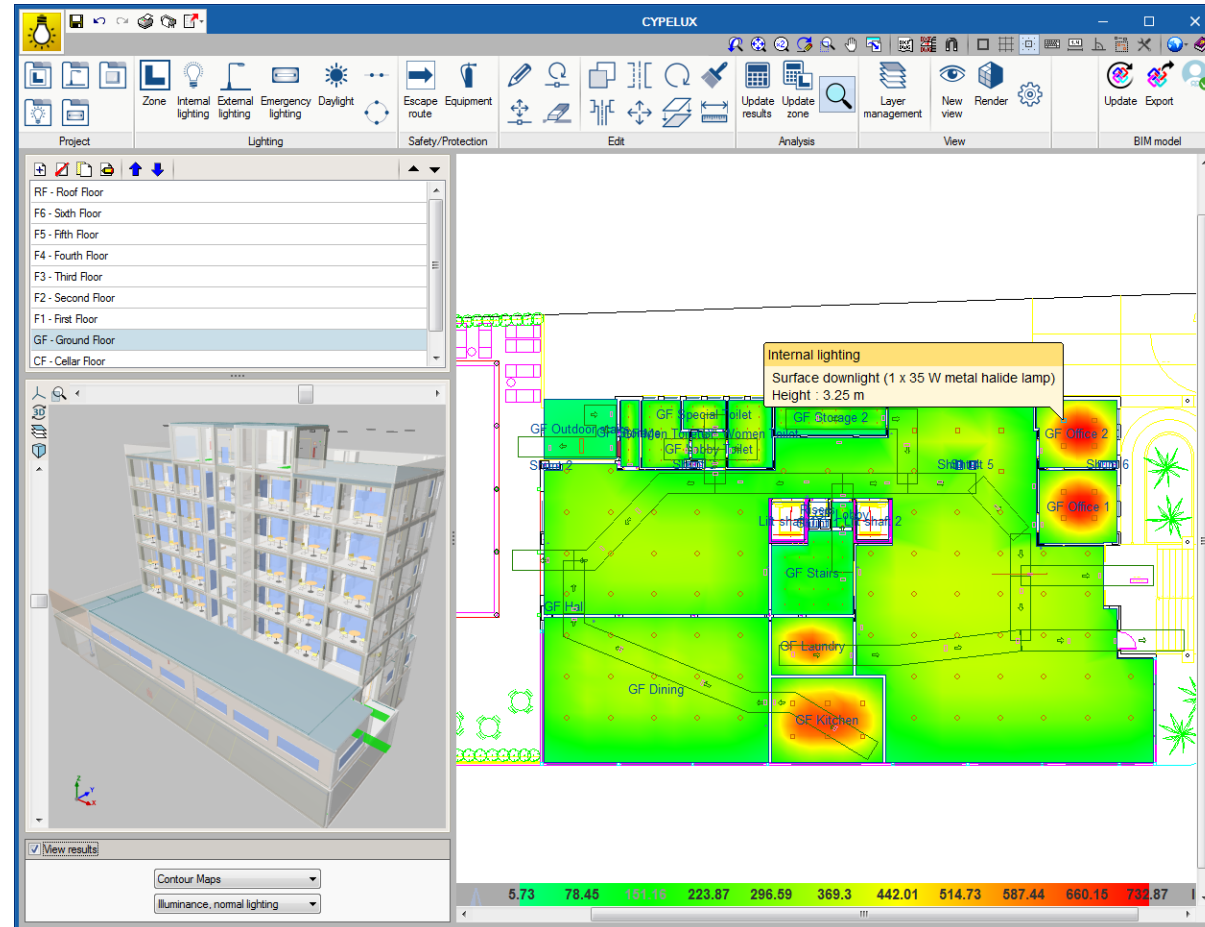
# Accuracy and Quality

## Lighting



# Accuracy and Quality

## Lighting



# Sustainability

ELODIE by CYPE - v2022.c - [C:\...\Immeuble 12A rue du Patis Tatelin.elod]

Métré du modèle BIM Analyses du Cycle de Vie

Données générales Bibliothèque INIES Fiches de mise à jour Injecter un RSET Importer un RS2E Importer un projet Exporter mon projet Ajouter Effacer Dupliquer Rechercher Déplacer vers le haut Déplacer vers le bas Couper Copier Coller Erreurs d'édition Calculer Résultats graphiques Synthèse E+C- Générer le RS2E Générer le RSENV Exporter les résultats (.csv) Actualiser

Projet

Édition Résultats Récapitulatifs

Projet

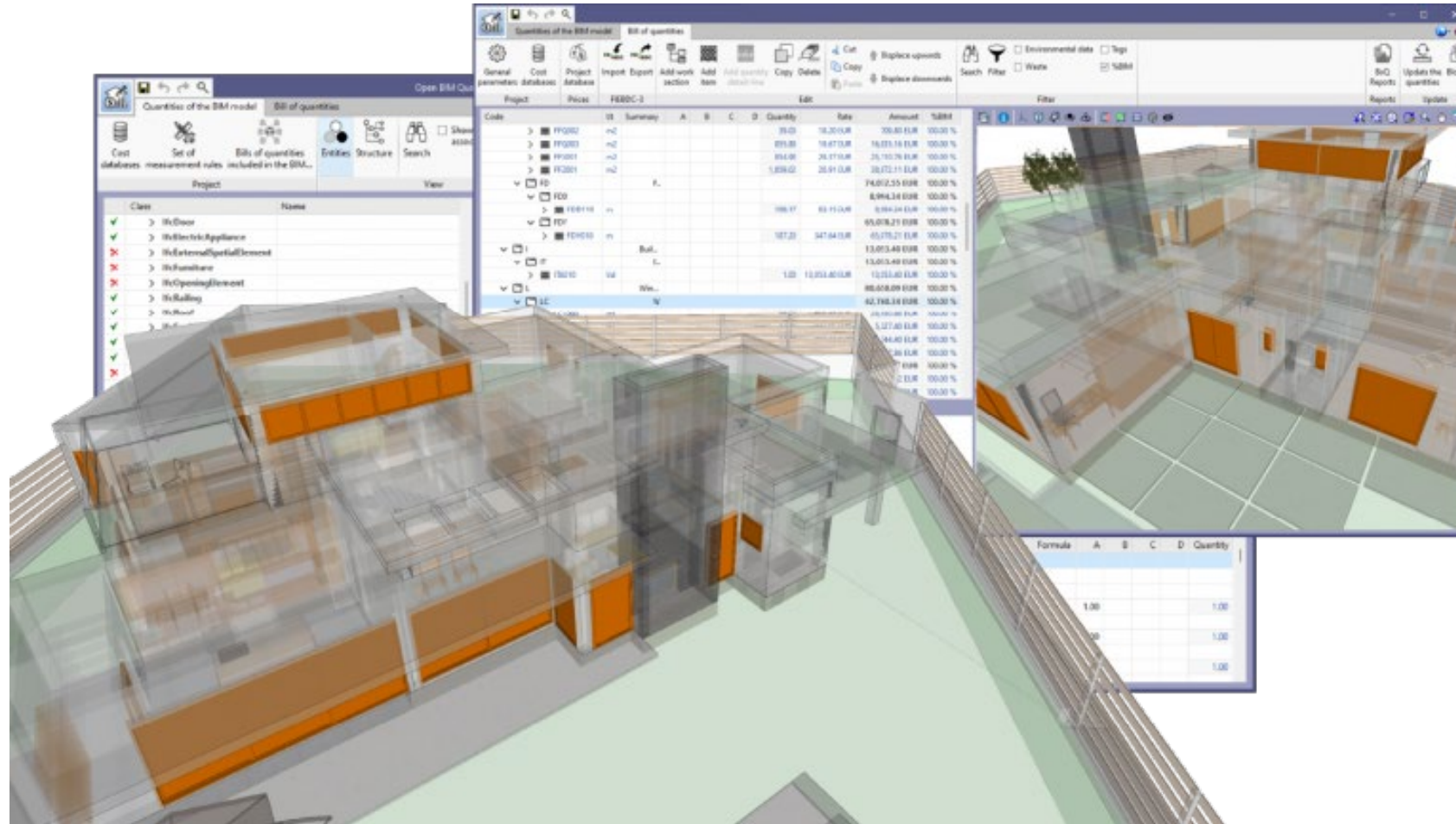
1 de 2 Partager Exporter Imprim

	Étape de production	Étape du processus de construction	Étape d'utilisation	Étape de fin de vie	Total cycle de vie
<b>Impacts environnementaux</b>					
Réchauffement climatique (kg CO2 eq.)	4.56e+005	1.80e+005	1.38e+005	4.88e+004	9.02e+005
Appauvrissement de la couche d'ozone (kg CFC-11 eq.)	3.65e-002	1.50e-002	1.63e-002	1.13e-002	7.80e-002
Acidification des sols et de l'eau (kg SO2 eq.)	1.43e+003	4.78e+002	5.19e+002	2.64e+002	2.59e+003
Eutrophisation (kg (PO4)3- eq.)	1.02e+003	7.87e+001	2.74e+002	1.22e+002	1.44e+003
Formation d'ozone photochimique (kg C2H4 eq.)	4.30e+002	7.55e+001	5.30e+002	1.94e+001	1.05e+003
Épuisement des ressources abiotiques - éléments (kg Sb eq.)	1.25e+000	1.22e-001	4.09e-001	4.21e-002	9.11e-001
Épuisement des ressources abiotiques - combustibles fossiles (MJ)	4.97e+006	1.79e+006	2.22e+006	6.10e+005	9.35e+006
<b>Consommation des ressources</b>					
Utilisation de l'énergie primaire renouvelable, à l'exclusion des ressources d'énergie primaire renouvelables utilisées comme matières premières (MJ)	3.81e+005	3.37e+004	2.47e+005	9.86e+003	6.38e+005
Utilisation des ressources d'énergie primaire renouvelables utilisées en tant que matières premières (MJ)	9.85e+005	2.69e+004	1.56e+004	2.63e+003	1.02e+006
Utilisation totale des ressources d'énergie primaire renouvelables (énergie primaire et ressources d'énergie primaire utilisées comme matières premières) (MJ)	1.37e+006	6.05e+004	2.63e+005	1.25e+004	1.66e+006
Utilisation de l'énergie primaire non renouvelable, à l'exclusion des ressources d'énergie primaire non renouvelables utilisées comme matières premières (MJ)	5.57e+006	1.83e+006	1.45e+006	6.83e+005	9.26e+006
Utilisation des ressources d'énergie primaire non renouvelables utilisées en tant que matières premières (MJ)	1.14e+006	5.10e+004	9.50e+005	3.87e+001	2.14e+006
Utilisation totale des ressources d'énergie primaire non renouvelables (énergie primaire et ressources d'énergie primaire utilisées comme matières premières) (MJ)	6.71e+006	1.88e+006	2.40e+006	6.83e+005	1.14e+007
Utilisation totale des ressources	8.09e+006	1.94e+006	2.67e+006	6.95e+005	1.31e+007

# Budget Management

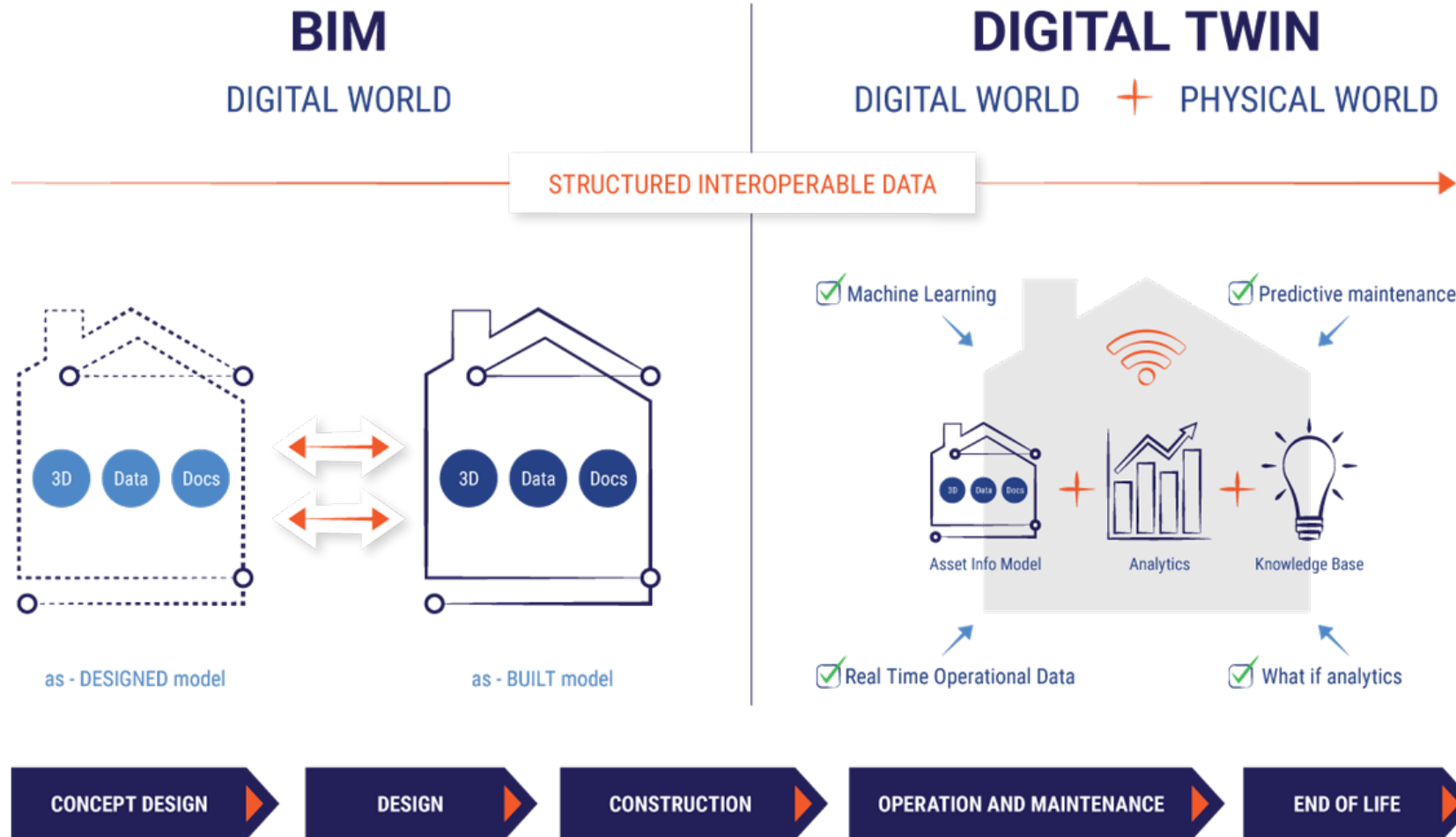


# Budget Management

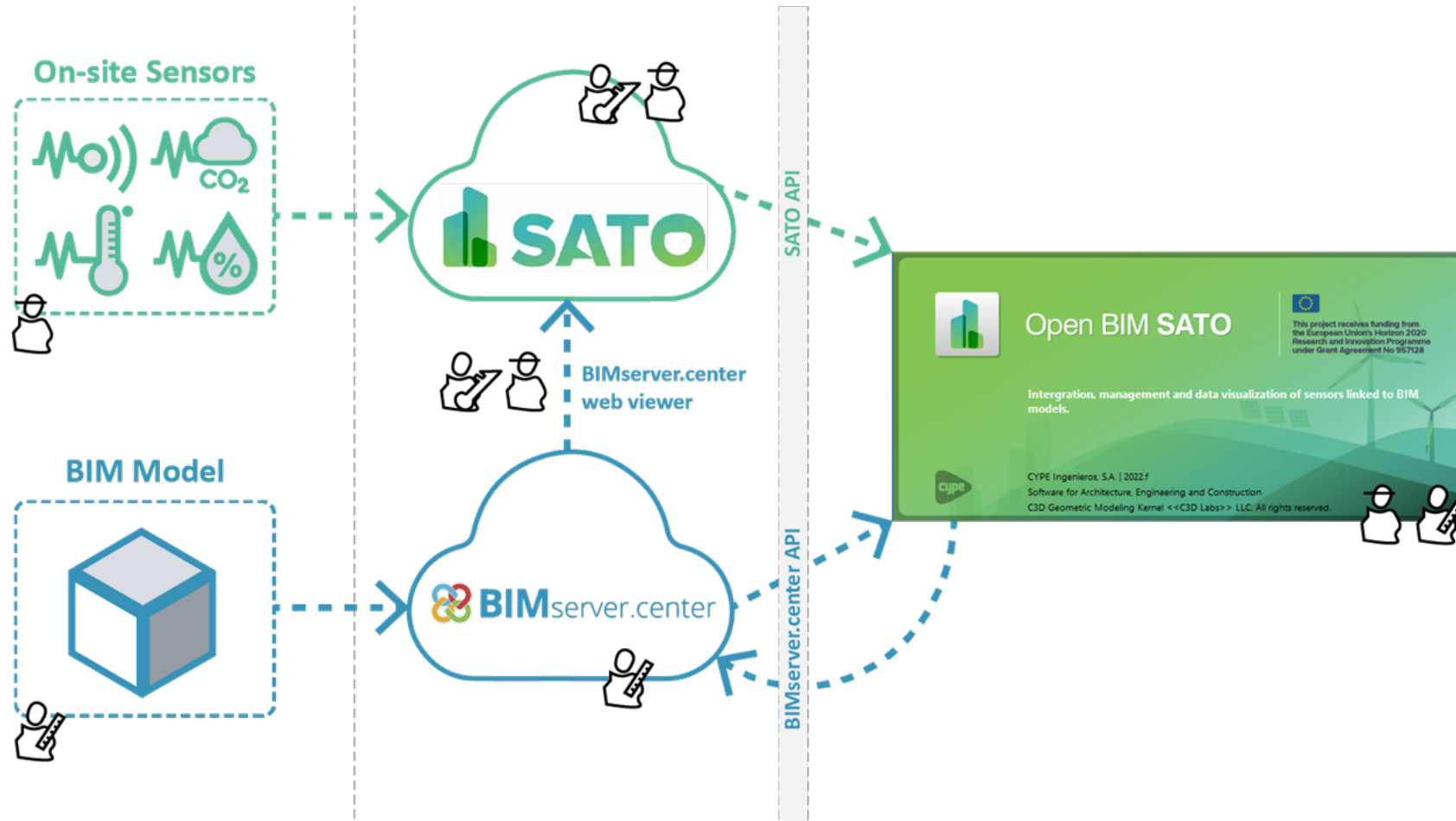




# Digital Twin



# Digital Twin



# Conclusions

- Enhanced Collaboration and Coordination
- Improved Accuracy and Quality
- Enhanced Sustainability
- Cost Efficiency and Budget Management
- Digital Twin Creation for the future

**If you would like more information,  
please visit [www.timepac.eu](http://www.timepac.eu) or contact us at  
[benjamin.gonzalez@cype.com](mailto:benjamin.gonzalez@cype.com)**

Thanks for your attention!