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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





SERA

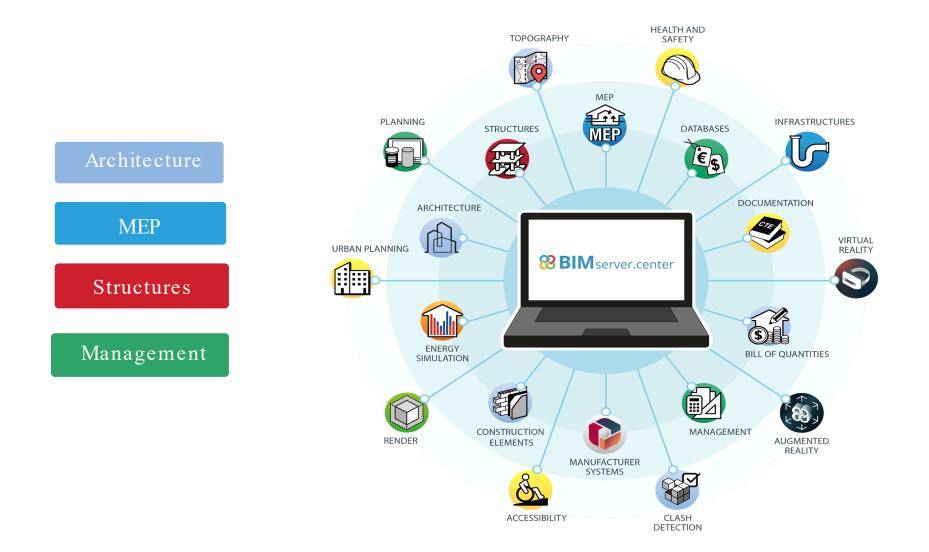
Institute for Sustainable Energy and Resources Availability



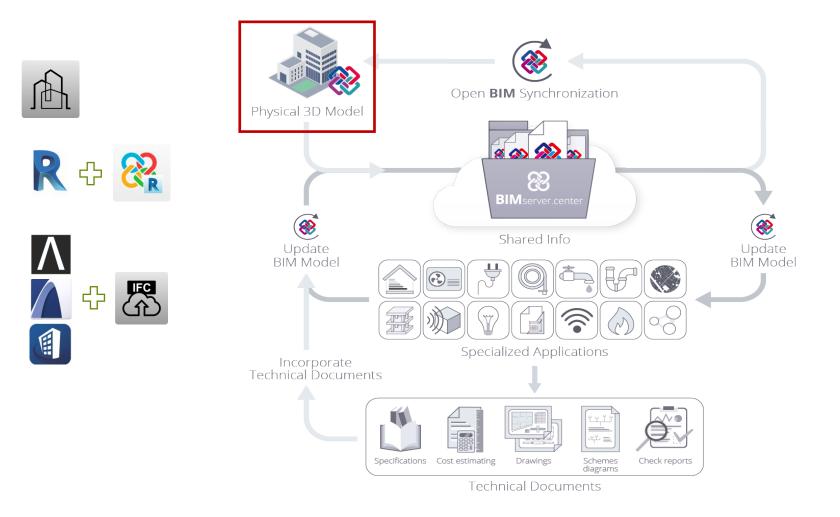
Advantages of creating a BIM model for building renovation

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

Collaboration and Coordination



Collaboration and Coordination



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Integration of Open BIM and EPC: lessons learned || Benjamín González

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ARCHITECTURAL MODEL

ANALYTICAL MODEL External Surfaces



ANALYTICAL MODEL Internal Surfaces





ANALYTICAL MODEL Edges

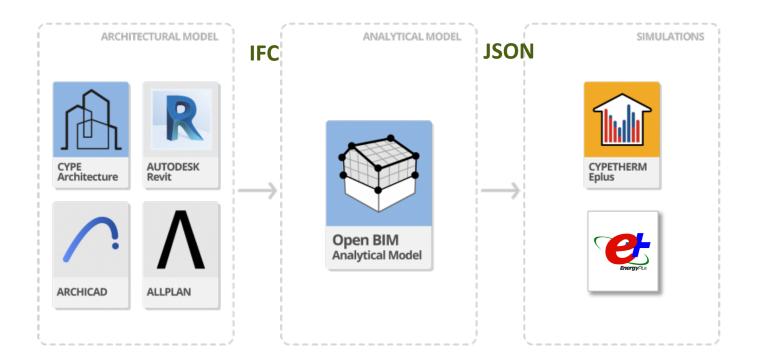
Option 1. IFC exchange using BIM tools (CYPE Architecture, Revit, Archicad, Allplan,...)

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



Open BIM Workflow. Option 1

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Open BIM Workflow. Option 1

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ARCHITECTURAL
MODELANALYTICAL
MODELImage: Constraint of the second sec

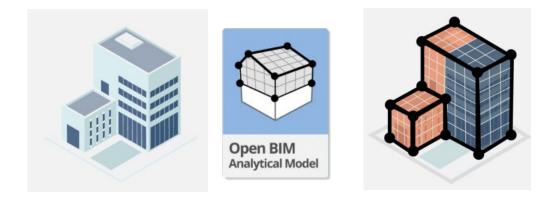
✓ Walls, floors, windows...

✓ Surfaces, edges, boundaries ...

Open BIM Workflow. Option 1

ARCHITECTURAL MODEL

ANALYTICAL MODEL



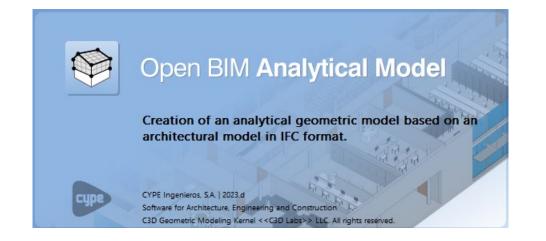
✓ Walls, floors, windows...

✓ Surfaces, edges, boundaries ...

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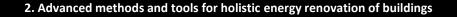
Open BIM Workflow. Option 1

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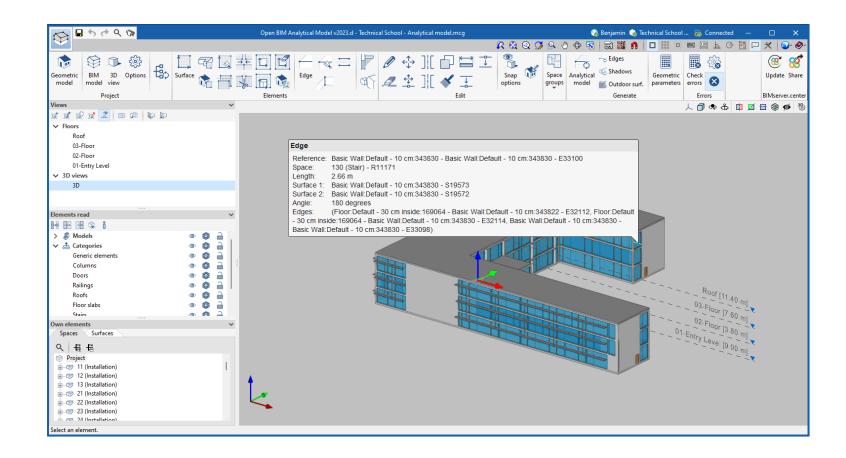
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https://learning.cype.com/en/video/open-bim-analytical-model/



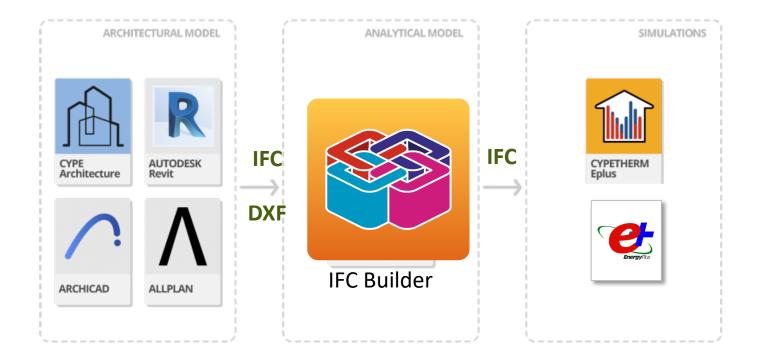
Open BIM Workflow. Option 1

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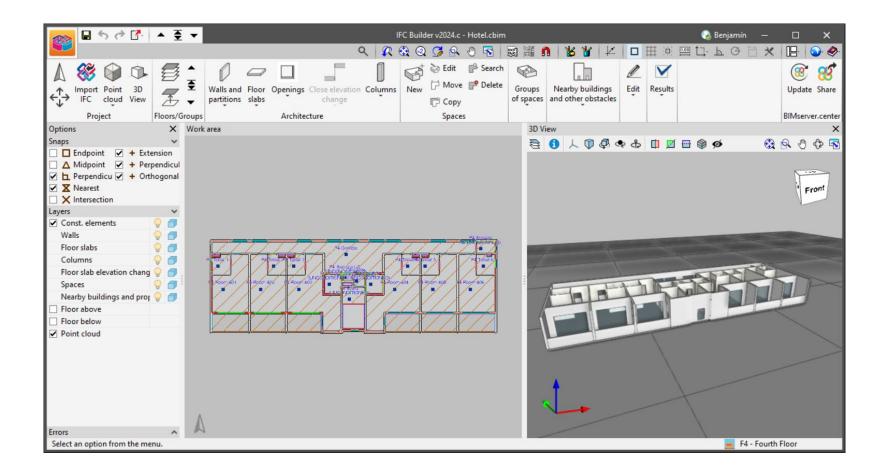
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Open BIM Workflow. Option 2. IFC Builder

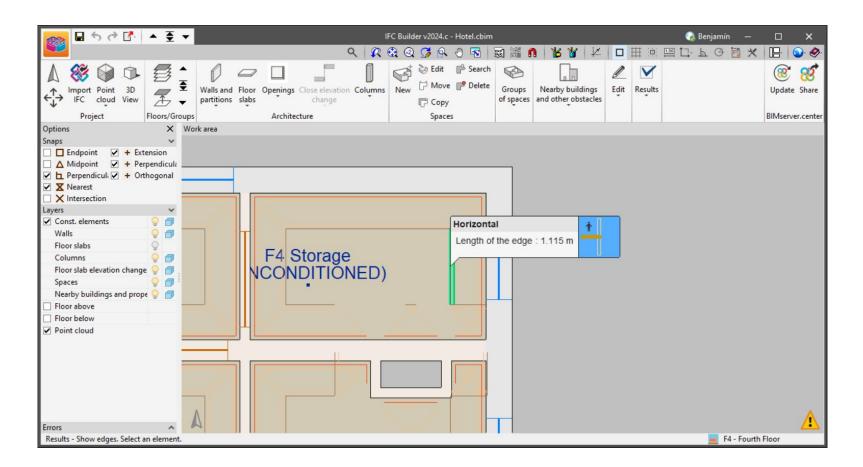


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Open BIM Workflow. Option 2. IFC Builder



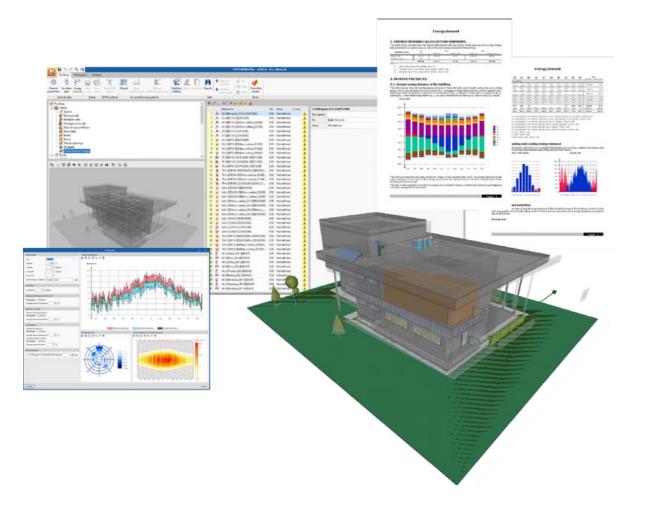
Open BIM Workflow. Option 2. IFC Builder





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Open BIM Workflow. CYPETHERM Eplus



Acoustic design





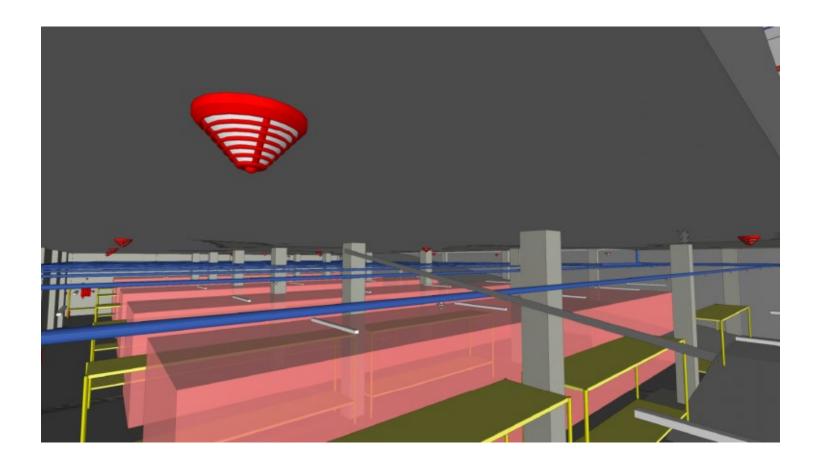
Acoustic design

Type	oom								
	Restaurant								
Volume	171.9 m ³								
Volume	171.5 11								
Reverberati		Area					Required		Verif
Tr (unfurni		7.34 m ²	()=) = (101 01 0				0.60	>
Continuous	ipment noise	Dn,w	/ (dB) C (dB) Ctr ((dB) LnA	T (dBA) Req 27	uired (dBA) ≤ 27		Verif
Hall									
Туре	Common Area								
Volume	197.43 mª								
Reverberatio	on	Area				Value	Required		Verif
A (unfurnish	ned)	248.32 m²				18.00 m ²	≥ 1.16 m ²		~
	gainst airbone nois	e Area/Length		B) C (dB)	Ctr (dB)	DnT,A (dB)	Required (dB)		Verif
Dining room		17.24 m²	53	-1	-4	52	≥ 45	+ 7	*
Adjacent bu		27.96 m²	58	-1	-6	57	≥ 40	+ 17	×.
Meeting roo	m	33.15 m²	63	-1	-7	62	≥ 45	+ 17	1
Office 3 Office 4		4.74 m ² 0.64 m ²	71	-2	-9 -9	69 73	≥ 45 ≥ 45	+ 24 + 28	1
Ottice 4 Corridor		0.64 m ² 13.16 m ²	75 69	-2	-9	73	≥ 45 ≥ 45	+ 28	
	d pressure level	Area/Length		-2	-8	L'nT,w (dB)	≤ 40 Required (dB)	+ 22	Verif
Dining room		recordering of				55	≤ 60	- 5	×
Office 1 Type Volume	Protected 47.38 m ³								
Type Volume Insulation ag External	47.38 m ³ ainst outdoor noise	26.41 m ²	DnT,w (dB)	-2	-5	2m,nT,A,tr (dB) 40	Required (dB) ≥ 30	+ 10	Verif
Type Volume Insulation ag External Insulation ag	47.38 m³	26.41 m ² Area/Length	45 DnT,w (dB)	-2 C (dB) C	-5 tr (dB)	40 DnT,A (dB)	≥ 30 Required (dB)		¥ Verif
Type Volume Insulation ag External Insulation ag Dining room	47.38 m ³ ainst outdoor noise ainst airbone noise	26.41 m ² Area/Length (9.57 m ²	45 DnT,w (dB) 63	-2 C (dB) C -2	-5 tr (dB) -8	40 DnT,A (dB) 61	≥ 30	+ 10	¥
Type Volume Insulation ag External Insulation ag Dining room 201_503_1 Hall	47.38 m ³ ainst outdoor noise ainst airbone noise	26.41 m ² Area/Length	45 DnT,w (dB)	-2 C (dB) C -2 -2 -3	-5 tr (dB) -8 -8 -10	40 DnT,A (dB)	≥ 30 Required (dB)	+ 6	Verif
Type Volume External Insulation ag Dining room 201_S03_1 Hall Office 3	47.38 m ³ ainst outdoor noise ainst airbone noise	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ²	45 DnT,w (dB) 63 63 95 63	-2 C (dB) C -2 -2 -3 -3 -2	-5 tr (dB) -8 -8 -10 -9	40 DnT,A (dB) 61 61 92 61	≥ 30 Required (dB) ≥ 55 ≥ 50	+ 6	Verif V
Type Volume Insulation ag External Insulation ag Dining room Z01_S03_1 Hall Office 3 Office 4	47.38 m ³ ainst outdoor noise ainst airbone noise w01	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ²	45 DnT,w (dB) 63 63 95	-2 C (dB) C -2 -2 -3	-5 tr (dB) -8 -8 -10	40 DnT,A (dB) 61 61 92 61 63	≥ 30 <u>Required (dB)</u> ≥ 55 ≥ 50 ≥ 50	+ 6	Verif V
Type Volume External Insulation ag Dining room 201_S03_1 Hall Office 3 Office 4 Impact sound	47.38 m ³ ainst outdoor noise ainst airbone noise	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ²	45 DnT,w (dB) 63 63 95 63	-2 C (dB) C -2 -2 -3 -3 -2	-5 tr (dB) -8 -8 -10 -9	40 DnT,A (dB) 61 61 92 61 63 L'nT,w (dB)	≥ 30 <u>Required (dB)</u> ≥ 55 ≥ 50 ≥ 50 <u>></u> 50 <u>></u> 50	+ 6 + 11 + 13	Verif V
Type Volume Insulation ag External Insulation ag Dining room Z01_S03_1 Hall Office 3 Office 4	47.38 m ³ ainst outdoor noise ainst airbone noise w01	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ²	45 DnT,w (dB) 63 63 95 63	-2 C (dB) C -2 -2 -3 -2	-5 tr (dB) -8 -8 -10 -9	40 DnT,A (dB) 61 61 92 61 63	≥ 30 <u>Required (dB)</u> ≥ 55 ≥ 50 ≥ 50	+ 6	Verif V
Type Volume External Insulation ag Dining room Z01_S03_1 Hall Office 4 Impact sound Dining room	47.38 m ³ ainst outdoor noise ainst airbone noise w01	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Length	45 DnT,w (dB) 63 63 95 63	-2 C (dB) C -2 -2 -3 -2 -2 -2	-5 tr (dB) -8 -8 -10 -9 -8	40 DnT,A (dB) 61 61 63 63 L'nT,W (dB) 59 54 58	≥ 30 Required (dB) ≥ 55 ≥ 50 ≥ 50 Required (dB) ≤ 60	+ 6 + 11 + 13 - 1	Verif Verif Verif Verif
Type Volume Insulation ag External Insulation ag Dining room 201_S03_1 Hall Office 3 Office 4 Impact sound Dining room Office 4 Service equip	47.38 m ³ ainst outdoor noise ainst airbone noise w01 I pressure level	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Length 11.45 m ² 2.08 m ²	45 DnT,w (dB) 63 63 95 63	-2 C (dB) C -2 -2 -3 -2 -2 -2	-5 tr (dB) -8 -8 -10 -9	40 DnT,A (dB) 61 61 63 61 63 L'nT,w (dB) 59 54 58 LnAT (dBA)	≥ 30 Required (d8) ≥ 55 ≥ 50 Required (d8) ≤ 60 ≤ 65 ≤ 65 Required (dBA	+ 6 + 11 + 13 - 1 - 11 - 7	Verif Verif Verif Verif
Type Volume Insulation ag External Tissulation ag Dining room 201_503_1 Hall Office 3 Office 3 Office 3 Office 4 Service equip Continuous	47.38 m ³ ainst outdoor noise ainst airbone noise w01 I pressure level	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Length 11.45 m ² 2.08 m ²	45 DnT,w (dB) 63 63 95 63 63 65	-2 C (dB) C -2 -2 -3 -2 -2 -2	-5 tr (dB) -8 -8 -10 -9 -8	40 DnT,A (dB) 61 61 63 63 L'nT,W (dB) 59 54 58	≥ 30 Required (dB) ≥ 55 ≥ 50 ≥ 50 Required (dB) ≤ 60 ≤ 65 ≤ 65	+ 6 + 11 + 13 - 1 - 11 - 7	Verif Verif Verif Verif
Type Volume Insulation ag External Insulation ag Dining room 201_503_1 Hall Office 3 Office 4 Office 3 Office 4 Service equip Continuous WC gf	47.38 m ³ ainst outdoor noise ainst airbone noise w01 I pressure level ment noise	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Length 11.45 m ² 2.08 m ²	45 DnT,w (dB) 63 63 95 63 63 65	-2 C (dB) C -2 -2 -3 -2 -2 -2	-5 tr (dB) -8 -8 -10 -9 -8	40 DnT,A (dB) 61 61 63 61 63 L'nT,w (dB) 59 54 58 LnAT (dBA)	≥ 30 Required (d8) ≥ 55 ≥ 50 Required (d8) ≤ 60 ≤ 65 ≤ 65 Required (dBA	+ 6 + 11 + 13 - 1 - 11 - 7	Verif Verif Verif Verif
Type Volume Insulation ag Exernal Insulation ag Dining room 201_502_1 Hall Office 3 Office 4 Impact sound Dining room Office 4 Service equip Continuous WC gf Type	47.38 m ³ ainst outdoor noise ainst airbone noise wo1 I pressure level ment noise Habitable	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Length 11.45 m ² 2.08 m ²	45 DnT,w (dB) 63 63 95 63 63 65	-2 C (dB) C -2 -2 -3 -2 -2 -2	-5 tr (dB) -8 -8 -10 -9 -8	40 DnT,A (dB) 61 61 63 61 63 L'nT,w (dB) 59 54 58 LnAT (dBA)	≥ 30 Required (d8) ≥ 55 ≥ 50 Required (d8) ≤ 60 ≤ 65 ≤ 65 Required (dBA	+ 6 + 11 + 13 - 1 - 11 - 7	Verif Verif Verif Verif
Type Volume Insulation ag External Insulation ag Dining room 201_503_1 Hall Office 3 Office 4 Office 3 Office 4 Service equip Continuous WC gf	47.38 m ³ ainst outdoor noise ainst airbone noise w01 I pressure level ment noise	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Length 11.45 m ² 2.08 m ²	45 DnT,w (dB) 63 63 95 63 63 65	-2 C (dB) C -2 -2 -3 -2 -2 -2	-5 tr (dB) -8 -8 -10 -9 -8	40 DnT,A (dB) 61 61 63 61 63 L'nT,w (dB) 59 54 58 LnAT (dBA)	≥ 30 Required (d8) ≥ 55 ≥ 50 Required (d8) ≤ 60 ≤ 65 ≤ 65 Required (dBA	+ 6 + 11 + 13 - 1 - 11 - 7	Verif Verif Verif Verif
Type Volume Insulation ag Extensi Insulation ag Dining room Office 3 Office 3 Office 3 Office 4 Impact sound Office 3 Office 4 Service equip Continuous WC gf Type Volume Insulation ag	47.38 m ³ ainst outdoor noise ainst airbone noise wo1 I pressure level ment noise Habitable 18.16 m ³ gainst airbone nois	26.41 m ³ Area/Length (9.57 m ² 9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Length 11.45 m ² 2.08 m ² e Area/Length	45 DnT,w (dB) 63 63 65 65 Dn,w (dB) DnT,w (dB)	-2 C (dB) C -2 -3 -2 -2 -2 C (dB) C B) C (dB)	-5 tr (dB) -8 -9 -10 -9 -9 -8 tr (dB) tr (dB)	40 DnT.A (dB) 61 61 62 61 63 63 59 54 59 54 50 LnAT (dBA) -18	≥ 30 Required (dB) ≥ 50 ≥ 50 ≥ 50 Required (dB) ≤ 60 ≤ 65 ≤ 65 ≤ 65 ≤ 27 Required (dB) Required (dB)	+ 6 + 11 + 13 - 1 - 11 - 7) - 45	Verifi Verifi Verifi Verifi Verifi
Type Volume Insulation ag External 201_502/ Hall Office 3 Office 4 Office 3 Office 4 Impact sound Dinfice 1 Service againgt Continuous WC gf Type Volume Insulation ag	47.38 m ³ ainst outdoor noise ainst airbone noise wo1 I pressure level Habitable 18.16 m ² anist airbone noise	26.41 m ³ Ares/Length (9.57 m ² 9.57 m ² 9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Length 11.45 m ² 2.08 m ² 4.00 m ² 4.	45 DnT,w (dB) 63 63 63 65 63 65 65 0 Dn,w (dB) DnT,w (dB) DnT,w (dB)	-2 C (dB) C -2 -2 -3 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2	-5 tr (dB) -8 -8 -10 -9 -9 -8 tr (dB) tr (dB) -7 -7	40 DnT,A (dB) 61 61 92 61 63 12 75 50 54 50 LnAT (dBA) -10 DnT,A (dB) 52	≥ 30 Required (dB) ≥ 55 ≥ 50 ≥ 50 Required (dB) ≤ 65 ≤ 65 ≤ 65 ≤ 27	+ 6 + 11 + 13 - 1 - 11 - 7	Verifi Verifi Verifi Verifi Verifi
Type Volume Insulation ag External Insulation ag Dining room 201, 503, Hall Offica 3 Offica 4 Service equip Continuous WC gf Type Volume Insulation ag Dining room 201, 504, Service equip Volume	47.38 m ³ ainst outdoor noise ainst airbone noise wo1 I pressure level ment noise Habitable Ba.16 m ² gainst airbone nois	26.41 m ² Ares/Length [9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Length 11.45 m ² 2.08 m ² 11.45 m ² 3.04 m ² 3.04 m ²	45 DnT,w (dB) 63 63 65 63 65 Dn,w (dB) Dn,w (dB)	-2 -2 -2 -2 -2 -2 -2 -2 -2 -2	-5 tr (dB) -8 -8 -9 -9 -9 -9 -8 tr (dB) tr (dB) -7 -11	40 DnT,A (dB) 61 61 92 61 53 53 59 54 54 54 54 54 54 54 54 54 54 54 54 54	≥ 30 Required (dB) ≥ 50 ≥ 50 ≥ 50 Required (dB) ≤ 60 ≤ 65 ≤ 65 ≤ 65 ≤ 27 Required (dB) Required (dB)	+ 6 + 11 + 13 - 1 - 11 - 7) - 45	Verifi Verifi Verifi Verifi Verifi
Type Volume Insulation ag External 201_5021 Hall Office 3 Office 4 Office 3 Office 4 Impact sound Office 3 Office 4 Service aquig Continuous WC gf Type Volume Insulation ag Dining room 201_504_201_504_ 201_504_201_504_ 201_504_201_504_201_504_ 201_504_200_500_200000000000000000000000000	47.38 m ³ ainst outdoor noise ainst airbone noise wo1 I pressure level ment noise Habitable Ba.16 m ² gainst airbone nois	26.41 m ³ Ares/Length (9.57 m ² 9.57 m ² 9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Length 11.45 m ² 2.08 m ² 4.00 m ² 4.	45 DnT,w (dB) 63 63 63 63 63 65 65 Dn,w (dB) Dn,w (dB) DnT,w (dB) DnT,w (dB) 53 64 54	-2 -2 -2 -2 -2 -2 -2 -2 -2 -2	-5 tr (dB) -8 -8 -9 -9 -8 -8 -9 -8 -8 -10 -9 -8 -8 -10 -9 -7 -7 -11 -7	40 DnT,A (dB) 61 61 92 61 63 61 63 59 54 58 LinT,w (dB) -18 -18 -18 -18 -18 -18 -18 -18 -18 -18	≥ 30 Required (dB) ≥ 50 ≥ 50 ≥ 50 Required (dB) ≤ 60 ≤ 65 ≤ 65 ≤ 65 ≤ 27 Required (dB) Required (dB)	+ 6 + 11 + 13 - 1 - 11 - 7) - 45	Verifi Verifi Verifi Verifi Verifi
Type Volume Insulation ag External Insulation ag Dining room 201, 503, 1 Hall Offica 3 Offica 4 Dining room Offica 3 Offica 4 Service aquip Continuous WC gf Type Volume Insulation ag Dining room 201, 504, 201 Dining room 201, 504, 201 Hall	47.38 m ³ ainst outdoor noise ainst airbone noise wo1 I pressure level Habitable 18.16 m ³ gainst airbone noise	26.41 m ² Area/Length 7 9.57 m ² 9.57 m ² 9.57 m ² 2.08 m ² 2.08 m ² Area/Length 13.45 m ² 2.08 m ²	45 DDT,w (dB) 63 63 95 63 63 65 Dn,w (dB) Dn,w (dB) DnT,w (dB) DnT,w (dB) 0 DnT,w (dB) 0 5 3 64 54 89	-2 C (dB) C -2 -2 -2 -2 -2 -2 -2 -2 -2 -2	-5 tr (dB) -8 -8 -10 -9 -9 -8 tr (dB) tr (dB) -7 -11 -7 -9 -8	40 DnT,A (dB) 61 61 92 61 63 129 63 1207,W (dB) 75 54 56 54 56 10 -10 -10 -10 -10 -10 -10 -10 -10 -10	≥ 30 Required (db) ≥ 55 ≥ 50 ≥ 50 ≥ 50 ≥ 50 ≤ 60 ≤ 65 ≤ 65 ≤ 65 ≤ 65 ≤ 65 ≤ 27 Required (db) ≥ 45	+ 6 + 11 + 13 - 1 - 11 - 7 - 45 + 7	Verifi Verifi Verifi Verifi
Type Volume Insulation ag External Insulation ag Dining room 201_503_1 Hall Offica 3 Offica 4 Dining room Offica 3 Offica 4 Service equip Continuous WC gf Type Volume Insulation ag Dining room Zo1_504_ Hall Adjacent bus	47.38 m ³ ainst outdoor noise ainst airbone noise wo1 I pressure level Habitable 18.16 m ³ gainst airbone noise	26.41 m ² Area/Length 9.57 m ² 9.57 m ² 9.57 m ² 9.57 m ² 2.00 m ² Area/Length 11.45 m ² 2.00 m ² 11.45 m ² 2.00 m ² 3.01 m ² 3.04 m ² 9.57 m ² 3.04 m ² 9.57 m ²	45 DnT,w (dB) 63 63 63 63 63 63 63 63 0 Dn,w (dB) DnT,w (dB) DnT,w (dB) 0 DnT,w (dB) 54 63 63 63 63 63 63 63 63 63 63 63 53 54 53 54 54 54 54 54 55 55 55 55 55 55 55 55	-2 -2 -2 -3 -3 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2	-5 tr (dB) -8 -8 -9 -9 -9 -8 tr (dB) tr (dB) -7 -7 -7 -9 -7 -7 -9 -7 -7	40 DnT,A (dB) 61 62 62 63 147,W (dB) 59 54 50 LnAT (dBA) -10 52 61 52 61 52 61 52 65 65	≥ 30 Required (d8) ≥ 55 ≥ 50 ≥ 50 ≥ 50 ≥ 50 ≤ 60 ≤ 65 ≤ 65 ≤ 65 ≤ 65 ≤ 65 ≤ 27 ≥ 40 ≥ 40	+ 6 + 11 + 13 - 1 - 11 - 7 - 11 - 7 - 1 - 7 - 7 - 45 + 7 + 9	Verif
Type Volume Insulation ag External Dining room 201,502,1 Office 3 Office 4 Impact Sound Dining room Office 3 Service agging Continuous WC gf Type Dining room Dining room Dining room Dining room Dining room Dining room Dining room 201,504,2 Hall Adjacent bu WC 1f	47.38 m ³ ainst outdoor noise ainst airbone noise wo1 I pressure level Habitable 18.16 m ³ gainst airbone noise	26.41 m ² Area/Length 7 9.57 m ² 9.57 m ² 9.57 m ² 2.08 m ² 2.08 m ² Area/Length 13.45 m ² 2.08 m ²	45 DnT,w (dB) 63 63 65 65 Dn,w (dB) Dn,w (dB) DnT,w (dB) 53 64 54 64 51 59	-2 C (dB) C -2 -2 -2 -2 -2 -2 -2 -2 -2 -2	-5 tr (dB) -8 -8 -10 -9 -9 -8 tr (dB) tr (dB) -7 -11 -7 -9 -8	40 DnT,A (dB) 61 61 92 61 63 129 63 1207,W (dB) 75 54 56 54 56 10 -10 -10 -10 -10 -10 -10 -10 -10 -10	≥ 30 Required (db) ≥ 55 ≥ 50 ≥ 50 ≥ 50 ≥ 50 ≤ 60 ≤ 65 ≤ 65 ≤ 65 ≤ 65 ≤ 65 ≤ 27 Required (db) ≥ 45	+ 6 + 11 + 13 - 1 - 11 - 7 - 45 + 7	Verit Verit Verit Verit

Dining ro	oom								
Type	Restaurant								
Volume	171.9 m ³								
Reverberati		Area					Required		Ve
Tr (unfurni	ished) 207 ipment noise	7.34 m ²	(dB) C (dl	B) Ctr (≤ 0.90 s + uired (dBA)	0.60	Ve
Continuous		Un,v	(db) C (di	b) Cfr (27 Keq	≤ 27		Ve
Hall									
Туре	Common Area								
Volume	197.43 m²								
Reverberatio	on	Area				Value	Required		Ve
A (unfurnish	hed)	248.32 m²				18.00 m ²	≥ 1.16 m²	_	
	gainst airbone noise				Ctr (dB)	DnT,A (dB)	Required (dB)		Ve
Dining room		17.24 m²	53	-1	-4	52	≥ 45	+ 7	
Adjacent bu Meeting roo		27.96 m ² 33.15 m ²	58 63	-1	-6 -7	57 62	≥ 40 ≥ 45	+ 17 + 17	
Office 3		4.74 m ²	71	-2	-9	69	≥ 45	+ 24	
Office 4		0.64 m²	75	-2	-9	73	≥ 45	+ 28	
Corridor		13.16 m ²	69	-2	-8	67	≥ 45	+ 22	
	id pressure level	Area/Length				L'nT,w (dB)	Required (dB)		Ve
Office 1 Type Volume	Protected 47.38 m ³					55	≤ 60	- 5	
Office 1 Type Volume	Protected			C (dB) Ct	r (dB) D2	55 m,nT,A,tr (dB)		-	v
Office 1 Type Volume Insulation ag External	Protected 47.38 m³ ainst outdoor noise	26.41 m ²	45	-2	-5	:m,nT,A,tr (dB) 40	Required (dB) ≥ 30	-	
Office 1 Type Volume Insulation ag External Insulation ag	Protected 47.38 m ⁸	26.41 m ² Area/Length	45 DnT,w (dB) (-2 C (dB) Ct	-5 r (dB)	im,nT,A,tr (dB) 40 DnT,A (dB)	Required (dB) ≥ 30 Required (dB)	+ 10	
Office 1 Type Volume Insulation ag External Insulation ag Dining room 201_503_1	Protected 47.38 m ^a ainst outdoor noise ainst airbone noise	26.41 m ²	45 DnT,w (dB) 0 63 63	-2 C (dB) Ct -2 -2	-5 r (dB) -8 -8	im,nT,A,tr (dB) 40 DnT,A (dB) 61	Required (dB) ≥ 30		
Office 1 Type Volume Insulation ag External Insulation ag Dining room Z01_503_U Hall	Protected 47.38 m ³ mainst outdoor noise mainst airbone noise	26.41 m ² Area/Length (9.57 m ² 9.57 m ²	45 DnT,w (dB) (63 63 95	-2 C (dB) Ct -2 -2 -3	-5 r (dB) -8 -8 -10	im,nT,A,tr (dB) 40 DnT,A (dB) 61 61 92	Required (dB) ≥ 30 Required (dB) ≥ 55	+ 10	V
Office 1 Type Volume External Insulation ag Dining room Z01_S03_1 Hall Office 3	Protected 47.38 m ³ mainst outdoor noise mainst airbone noise	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ²	45 DnT,w (dB) 0 63 63 95 63	-2 C (dB) Ct -2 -2 -3 -2	-5 r (dB) -8 -8 -10 -9	m,nT,A,tr (dB) 40 DnT,A (dB) 61 61 92 61	Required (dB) ≥ 30 Required (dB) ≥ 55 ≥ 50	+ 10 + 6 + 11	v
Office 1 Type Volume Insulation ag External Insulation ag Dining room Z01_503_1 Hall Office 3 Office 4	Protected 47.38 m ³ mainst outdoor noise mainst airbone noise	26.41 m ² Area/Length (9.57 m ² 9.57 m ²	45 DnT,w (dB) (63 63 95	-2 C (dB) Ct -2 -2 -3	-5 r (dB) -8 -8 -10 -9 -8	im,nT,A,tr (dB) 40 DnT,A (dB) 61 61 92	Required (dB) ≥ 30 Required (dB) ≥ 55	+ 10 + 6 + 11 + 13	v
Office 1 Type Volume Insulation ag External Insulation ag Dining room 201_S03_1 Hall Office 3 Office 4 Impact sound Dining room	Protected 47.38 m ³ ainst outdoor noise ainst airbone noise woi	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Length	45 DnT,w (dB) 0 63 63 95 63	-2 C (dB) Ct -2 -2 -3 -2	-5 r (dB) -8 -8 -10 -9 -8	m,nT,A,tr (dB) 40 DnT,A (dB) 61 61 61 62 61 63 61 63 61 63 63 L'nT,w (dB) 59	Required (dB) ≥ 30 Required (dB) ≥ 55 ≥ 50 ≥ 50 ≥ 50 ≥ 60	+ 10 + 6 + 11 + 13 - 1	v
Office 1 Type Volume Insulation ag External Insulation ag Dining room 201 [S03_1 Hall Office 3 Office 4 Impact sound Dining room Office 3	Protected 47.38 m ³ ainst outdoor noise ainst airbone noise woi	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Length 11.45 m ²	45 DnT,w (dB) 0 63 63 95 63	-2 C (dB) Ct -2 -2 -3 -2	-5 r (dB) -8 -8 -10 -9 -8	m,nT,A,tr (dB) 40 0nT,A (dB) 61 61 63 26 1 63 29 59 59 54	Required (dB) ≥ 30 ≥ 55 ≥ 50 ≥ 50 Required (dB) ≤ 50 ≥ 50 ≤ 60 ≤ 65	+ 10 + 6 + 11 + 13 - 1 - 11	v
Office 1 Type Volume Insulation ag External Insulation ag Dining room Z01_S03_T Hall Office 4 Impact sound Dining room Office 3 Office 4	Protected 47.38 m ³ ainst outdoor noise ainst airbone noise wo1 d pressure level	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Length 11.45 m ² 2.08 m ²	45 DnT.w (dB) (63 63 95 63 63 63	-2 C (dB) Ct -2 -3 -2 -2 -2 -2	-5 r (dB) -8 -8 -10 -9 -8	m,nT,A,tr (dB) 40 DnTA (dB) 61 61 63 L'nT,w (dB) 59 54 50	Required (dB) ≥ 30 ≥ 55 ≥ 55 ≥ 50 ≥ 50 Required (dB) ≤ 60 ≤ 65	+ 10 + 6 + 11 + 13 - 1 - 11 - 7	v
Office 1 Type Volume Insulation ag External Insulation ag Dining room 201 [S03_1 Hall Office 3 Office 4 Impact sound Dining room Office 3	Protected 47.38 m ³ ainst outdoor noise ainst airbone noise wo1 d pressure level	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Length 11.45 m ² 2.08 m ²	45 DnT.w (dB) (63 63 95 63 63 63	-2 C (dB) Ct -2 -3 -2 -2 -2 -2	-5 r (dB) -8 -8 -10 -9 -8	m,nT,A,tr (dB) 40 0nT,A (dB) 61 61 63 26 1 63 29 59 59 54	Required (dB) ≥ 30 ≥ 55 ≥ 50 ≥ 50 Required (dB) ≤ 50 ≥ 50 ≤ 60 ≤ 65	+ 10 + 6 + 11 + 13 - 1 - 11 - 7	v
Office 1 Type Volume Insulation ag External Insulation ag Dining room Office 3 Office 4 Office 4 Office 4 Office 4	Protected 47.38 m ³ ainst outdoor noise ainst airbone noise wo1 d pressure level	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Length 11.45 m ² 2.08 m ²	45 DnT.w (dB) (63 63 95 63 63 63	-2 C (dB) Ct -2 -3 -2 -2 -2 -2	-5 r (dB) -8 -8 -10 -9 -8	m.nT.A.tr (dB) 40 DnT.A (dB) 61 61 61 63 61 63 61 59 54 59 54 50 LnAT (dB)	Required (dB) ≥ 30 Required (dB) ≥ 55 ≥ 50 ≥ 50 ≥ 50 ≥ 65 ≤ 65 Required (dBA	+ 10 + 6 + 11 + 13 - 1 - 11 - 7	v
Office 1 Type Volume Insulation ag External Insulation ag Dining room Office 3 Office 4 Service equip Continuous	Protected 47.38 m ³ ainst outdoor noise ainst airbone noise wo1 d pressure level	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Length 11.45 m ² 2.08 m ²	45 DnT.w (dB) (63 63 95 63 63 63	-2 C (dB) Ct -2 -3 -2 -2 -2 -2	-5 r (dB) -8 -8 -10 -9 -8	m.nT.A.tr (dB) 40 DnT.A (dB) 61 61 61 63 61 63 61 59 54 59 54 50 LnAT (dB)	Required (dB) ≥ 30 Required (dB) ≥ 55 ≥ 50 ≥ 50 ≥ 50 ≥ 65 ≤ 65 Required (dBA	+ 10 + 6 + 11 + 13 - 1 - 11 - 7	v
Office 1 Type Volume Insulation ag External Insulation ag Dining room 201_503_1 Hall Office 3 Office 3 Office 3 Office 3 Office 3 Office 3 Office 3 Office 3 Office 3 Office 3	Protected 47.38 m ³ ainst outdoor noise ainst airbone noise woi d pressure level	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Length 11.45 m ² 2.08 m ²	45 DnT.w (dB) (63 63 95 63 63 63	-2 C (dB) Ct -2 -3 -2 -2 -2 -2	-5 r (dB) -8 -8 -10 -9 -8	m.nT.A.tr (dB) 40 DnT.A (dB) 61 61 61 63 61 63 61 59 54 59 54 50 LnAT (dB)	Required (dB) ≥ 30 Required (dB) ≥ 55 ≥ 50 ≥ 50 ≥ 50 ≥ 65 ≤ 65 Required (dBA	+ 10 + 6 + 11 + 13 - 1 - 11 - 7	v
Office 1 Type Volume Insulation ag External Insulation ag Dining recen Zo1_503_1 Office 3 Office 4 Service equip Continuous WC gf Type Volume	Protected 47.38 m ³ asinst outdoor noise asinst airbone noise woot d pressure level ment noise Habitable 18.16 m ²	26.41 m ² Area/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² Area/Langth 11.45 m ² 2.08 m ²	45 DnT,w (dB) C 63 63 63 65 65 Dn,w (dB) C	-2 (dB) Ct -2 -3 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2	-5 r (dB) -8 -8 -10 -9 -9 -8 r (dB)	m.nT.A.tr (dB) 40 DnT.A. (dB) 61 61 62 63 1 10 59 53 53 54 54 53 54 54 54 54 54 54 54 54 55 54 55 54 55 54 55 55	Required (dB) ≥ 30 Required (dB) ≥ 55 ≥ 50 ≥ 50 ≥ 60 ≤ 65 ≤ 65 ≤ 65 ≤ 27	+ 10 + 6 + 11 + 13 - 1 - 11 - 7	v
Office 1 Type Volume Insulation ag External Insulation ag Insulation ag Office 4 Office 3 Office 4 Office 3 Office 4 Service equip Continuous WC gf Type Volume Insulation ag Dining room	Protected 47.38 m ³ ainst outdoor noise ainst ainton noise woi 1 pressure level 4 pressure level Habitable 18.16 m ² gainst airbone noise	26.41 m ³ Ares/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ³ Ares/Length 13.01 m ²	45 DnT,w (dB) C 63 63 63 63 63 63 63 63 63 63 63 0 Dn,w (dB) C Dn,w (dB) C	-2 (dB) Ct -2 -3 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2	-5 r (dB) -8 -8 -10 -9 -8 r (dB) -7	m,nT,A,tr (d8) 40 DT,A (d8) 51 52 DT,A (d8) 10 10 10 10 10 10 10 10 10 10	Required (dB) ≥ 30 Required (dB) ≥ 55 ≥ 50 ≥ 50 ≥ 50 ≥ 65 ≤ 65 Required (dBA	+ 10 + 6 + 11 + 13 - 1 - 11 - 7	v
Office 1 Type Volume Insulation ag External Dimit Tool 1001 Office 3 Office 3 Office 4 Service equip Continuous WC gf Type Volume Insulation ag Dimit room 201504	Protected 47.38 m ³ ainst outdoor noise ainst sirbone noise woi 4 pressure level ment noise Habitable 18.16 m ² gainst airbone noise ⁹ Woi	2641 m ³ Ares/Length [9.57 m ³ 9.57 m ² 11.45 m ² 2.08 m ² Area/Length 11.45 m ³ 2.08 m ³ 11.45 m ³ 3.04 m ³	45 DnT,w (dB) 63 63 63 63 65 0 0 0 0 0 0 0 0 0 0 0 0 0	-2 C (dB) Ct -2 -2 -2 -2 -2 -2 -2 -2 -2 -2	-5 r (dB) -8 -8 -10 -9 -9 -8 r (dB) -7 -7 -11	m.nT.A.tr (d8) 40 00T.A (d8) 01 61 61 61 61 61 53 54 54 54 54 50 51 01,A (d8) 52 61	Required (dB) 2.30 2.35 2.55 2.50 2.60 Sequired (dB) 2.65 2.60 2.66 2.60 2.65 2.60 2.65 2.60 2.65 2.60 2.77 3.60 2.77 3.60 2.77 3.60 2.77 3.60 2.77 3.60 2.77	+ 10 + 6 + 11 + 13 - 1 - 11 - 7 - 45	v
Office 1 Type Volume Insulation ag External Insulation ag Insulation ag Office 3 Office 4 Service equip Continuous WC gf Type Volume Insulation ag Dining room Office 3 Office 4 Service equip Insulation ag Dining room Office 3 Office 4 Service equip Continuous Insulation ag Dining room Zoi _so4, Zoi _so4, Zoi _so4, Zoi _so4,	Protected 47.38 m ³ ainst outdoor noise ainst sirbone noise woi 4 pressure level ment noise Habitable 18.16 m ² gainst airbone noise ⁹ Woi	26.41 m ³ Ares/Length (9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ³ Ares/Length 13.01 m ²	45 DnT,w (dB) C 63 63 63 63 65 Dn,w (dB) C Dn,w (dB) C DnT,w (dB) C 53 64 54	-2 -2 -2 -3 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2	-5 r (dB) -8 -8 -10 -9 -8 -8 -7 -7 -11 -7	m,nT,A.tr (d8) 40 DnT,A (d8) 61 61 63 61 63 61 53 4 54 54 54 54 54 54 54 52 61 52 61 52	Required (dB) 2.30 2.35 2.55 2.50 2.60 Sequired (dB) 2.65 2.60 2.66 2.60 2.65 2.60 2.65 2.60 2.65 2.60 2.77 3.60 2.77 3.60 2.77 3.60 2.77 3.60 2.77 3.60 2.77	+ 10 + 6 + 11 + 13 - 1 - 11 - 7 - 45	v
Office 1 Type Volume Insulation ag External Insulation ag Tohing room 201_503_1 Hall Office 3 Office 4 Office 4	Protected 47.38 m ³ aniset antibore noise wei 4 preserve level 4 preserve level 18.16 m ² 18.16 m ² yeant atricose noise work	2641 m ³ Ares/Length [9.57 m ³ 9.57 m ² 11.45 m ² 2.08 m ² Area/Length 11.45 m ³ 2.08 m ³ 11.45 m ³ 3.04 m ³	45 DnT,w (dB) 63 63 63 63 65 0 0 0 0 0 0 0 0 0 0 0 0 0	-2 C (dB) Ct -2 -2 -2 -2 -2 -2 -2 -2 -2 -2	-5 r (dB) -8 -8 -10 -9 -9 -8 r (dB) -7 -7 -11	m.nT.A.tr (d8) 40 00T.A (d8) 01 61 61 61 61 61 53 54 54 54 54 50 51 01,A (d8) 52 61	Required (dB) 2.30 2.35 2.55 2.50 2.60 Sequired (dB) 2.65 2.60 2.66 2.60 2.65 2.60 2.65 2.60 2.65 2.60 2.77 3.60 2.77 3.60 2.77 3.60 2.77 3.60 2.77 3.60 2.77	+ 10 + 6 + 11 + 13 - 1 - 11 - 7 - 45	v
Office 1 Type Volume Insulation ag External Insulation ag Insulation ag Office 3 Office 4 Service equip Continuous WC gf Type Volume Insulation ag Dining room Office 3 Office 4 Service equip Insulation ag Dining room Office 3 Office 4 Service equip Continuous Insulation ag Dining room Zoi _so4, Zoi _so4, Zoi _so4, Zoi _so4,	Protected 47.38 m ³ aniset antibore noise wei 4 preserve level 4 preserve level 18.16 m ² 18.16 m ² yeant atricose noise work	26.41 m ³ 4.47s/Length (9.57 m ² 9.57 m ² 9.57 m ² 11.45 m ² 2.08 m ² 11.45 m ² 2.08 m ² 11.45 m ² 2.08 m ² 11.45 m ² 3.04 m ² 3.04 m ² 3.04 m ²	45 DnT,w (dB) C 63 63 95 63 63 63 63 65 Dn,w (dB) C DnT,w (dB) C DnT,w (dB) C 53 64 54 84 85	-2 -2 -2 -2 -2 -2 -2 -2 -2 -2	-5 r (dB) -8 -8 -10 -9 -9 -8 r (dB) -7 -7 -11 -7 -9	m.nT.A.tr (d8) 40 00T.A (d8) 61 61 61 61 61 61 61 51 53 54 54 54 54 54 54 54 55 61 52 61 52 61 52 66 52 66 61 52 66 52 66 52 66 66 52 66 52 66 52 66 52 66 52 52 66 52 52 66 52 52 52 66 52 52 52 66 52 52 52 52 52 52 52 52 52 52	Required (dB) 2.30 Required (dB) 2.50 2.50 2.50 2.60 5.65 Required (dB) 2.27 Required (dB) 2.45	+ 10 + 6 + 11 + 13 - 1 - 1 - 1 - 1 - 7 - 45 + 7	v

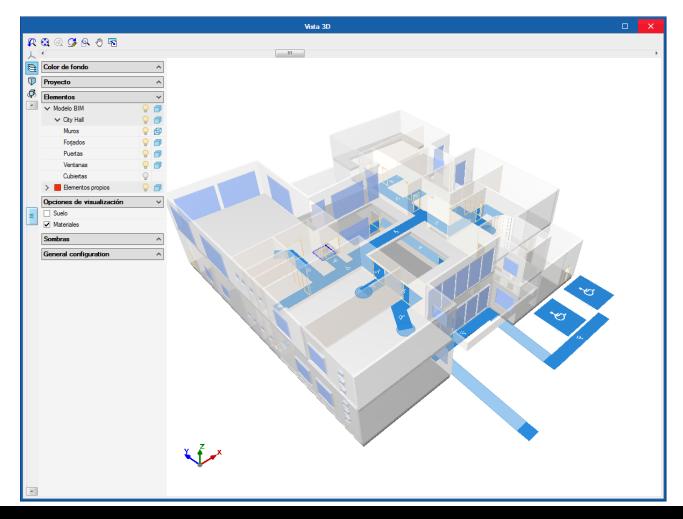
1.1 Br	
	L
	ick wall 13 (457.9 m²)
	Base element
Product	COGETHERM Pumise stone blocks 200 mm in thickness with 15 mm cement mortar on
Class	Masonry in Hollow concrete block
Origin	COGEBLOC
Mass Thickness	215 kg/m ²
Thickness	0.22 m
	Internal cover
Product	Interior cladding ISOCOMBO 140; dRw,heavy =14dB
Class	Wall lining with cellular foam
Origin	UNILIN-BVBA
Mass	14 kg/m²
Thickness	
1.2 Br	ick wall 17 (159.12 m²) Base element
Product	Concrete 17 cm
Class	Solid concrete
Class	
Class Origin	Traditional products
Class	Traditional products 400 kg/m ²
Class Origin Mass Thickness	Traditional products 400 kg/m ²
Class Origin Mass Thickness	Traditional products 400 kg/m ² 0.17 m fence (29.44 m ²)
Class Origin Mass Thickness 1.3 De	Traditional products 400 kg/m ² 0.17 m fence (29.44 m²) Base element
Class Origin Mass Thickness 1.3 De Product	Traditional products 400 kg/m ² 0.17 m fence (29.44 m ²) Base element Concrete 20 cm
Class Origin Mass Thickness 1.3 De Product Class	Traditional products 400 kg/m ² 0.17 m fence (29.44 m²) Base element Concrete 20 cm
Class Origin Mass Thickness 1.3 De Product Class Origin	Traditional products 400 kg/m² 60.7 m fence (29.44 m²) Ease element Concrete 20 cm Sald concrete Traditional products 470 kg/m²
Class Origin Mass Thickness 1.3 De Product Class Origin Mass Thickness 2 PAI	Traditional products 400 kg/m ² 0.17 m fence (29.44 m ²) Base element Concrete 20 cm Sold concrete TradeBala products 470 kg/m ² 0.2 m STITIONS Dated partition (121.22 m ²)
Class Origin Mass Thickness 1.3 De Product Class Origin Mass Thickness 2 PAI 2.1 Is	Tradiscian jorducts 400 kg/m ² 0.17 m fence (29.44 m ²) Base element Concrete 77 addisonal products 470 kg/m ² 0.2 m CTITIONS Dolated partition (121.22 m ²) Base element Base element
Class Origin Mass Thickness 1.3 De Product Class Origin Mass Thickness 2 PAI 2.1 Iso Product	Traditional products 400 kg/m ² 0.17 m fence (29.44 m ²) Base element Concrete 20 cm Sold concrete Traditional products 470 kg/m ² 0.2 m TITIONS Dated partition (121.22 m ²) Base element Partition wall 120/70 with FERMACEL baseds thickness 12.5 mm filled with ROCKCAL
Class Origin Mass Thickness 1.3 De Product Class Origin Mass Thickness 2 PAI 2.1 Is Product Class	Tradiscinal products 400 kg/m ² 0.17 m fence (29.44 m ²) Base element Concrete 20 cm Solid concrete Tradiscinal products 470 kg/m ² 0.2 m CTITIONS Dolated partition (121.22 m ²) Base element Partition wall 120/70 with EREMACELL boards thickness 12.5 mm filled with ROCKCAL Single frame dry partition wall
Class Origin Mass Thickness 1.3 De Product Class Origin Mass Thickness 2 PAI 2.1 Iso Product Class Origin	Tradiscianal products 400 kg/m ² 0.17 m fence (29.44 m ²) Base element Concrete 20 cm Sold concrete Tradeonal products 470 kg/m ² 0.2 m FITIIONS Dated partition (121.22 m ²) Base element Partition wall 120/70 with FERMACELL boards thickness 12.5 mm filled with ROCKCAL Single frame dry partition wall ROCKWOL
Class Origin Mass Thickness 1.3 De Product Class Origin Mass Thickness 2 PAI 2.1 Is Product Class	Tradiscial products 400 kg/m ² 9.17 m fence (29.44 m ²) Base element Concrete 20 cm Solid concrete Tradiscial products 470 kg/m ² 0.2 m CTITIONS Dated partition (121.22 m ²) Base element Partition wall 120/70 with ERMACELL boards thickness 12.5 mm filled with ROCKCAL Single frame dry partition wall ROCKWOOL E kg/m ²

Fire design

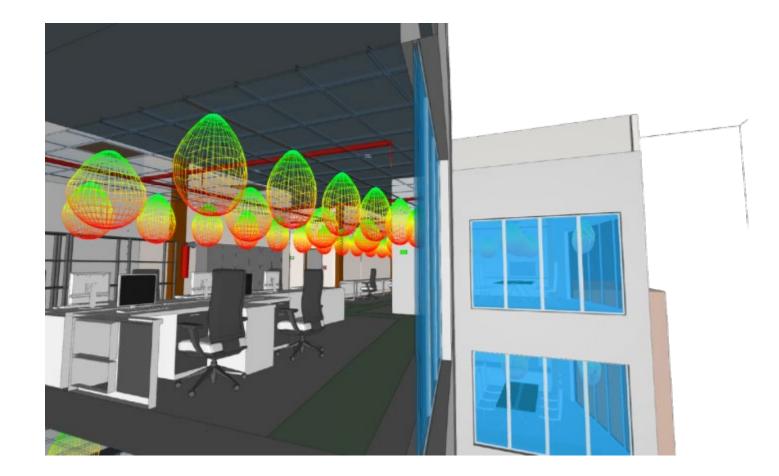




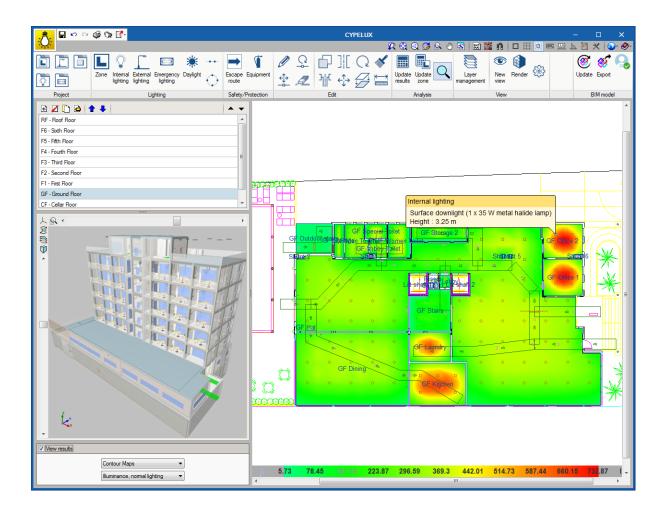
Accesibility design



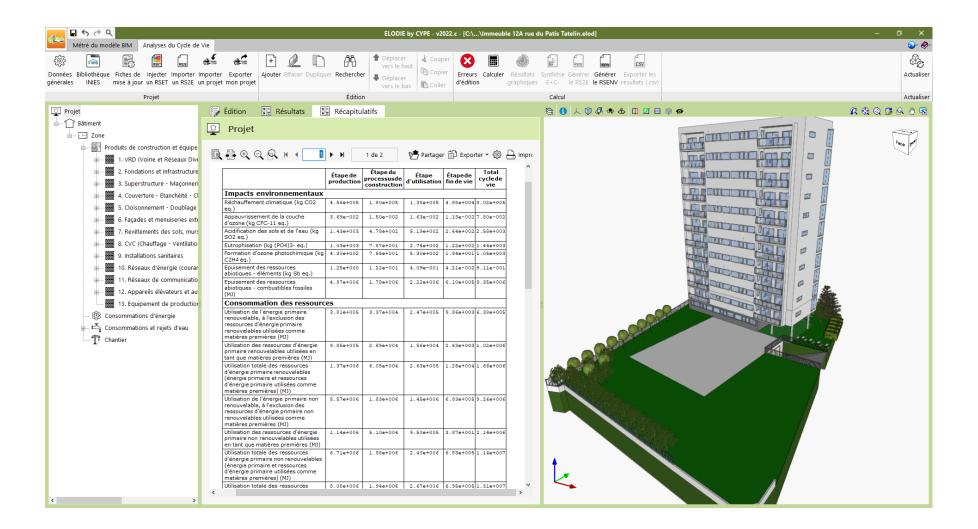
Lighting



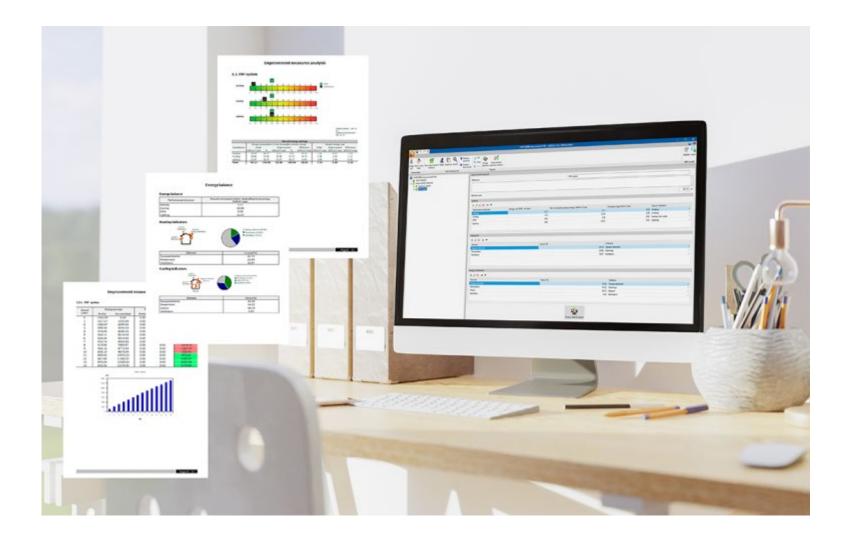
Lighting



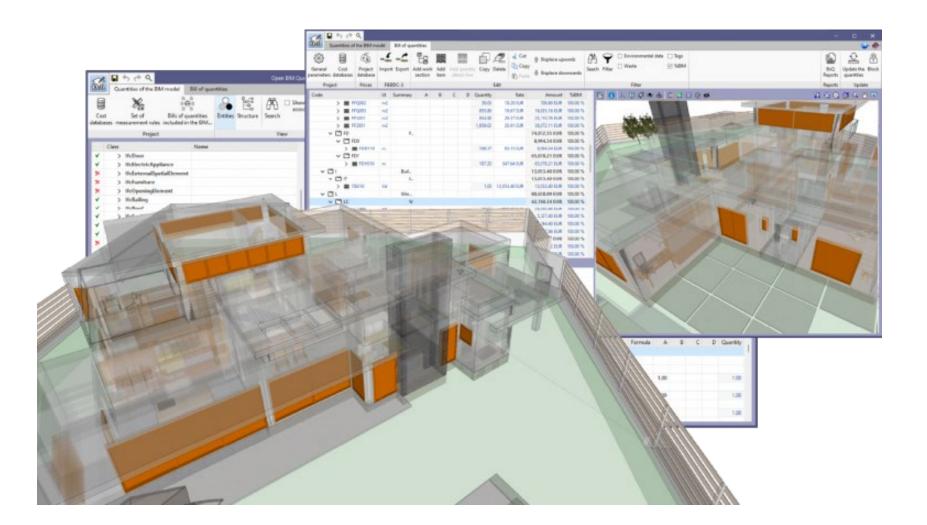
Sustainability



Budget Management

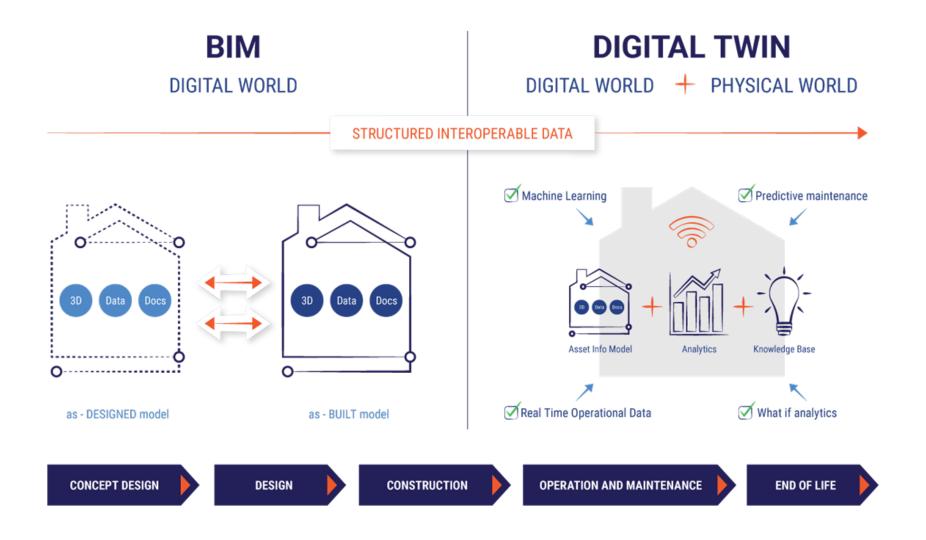


Budget Management

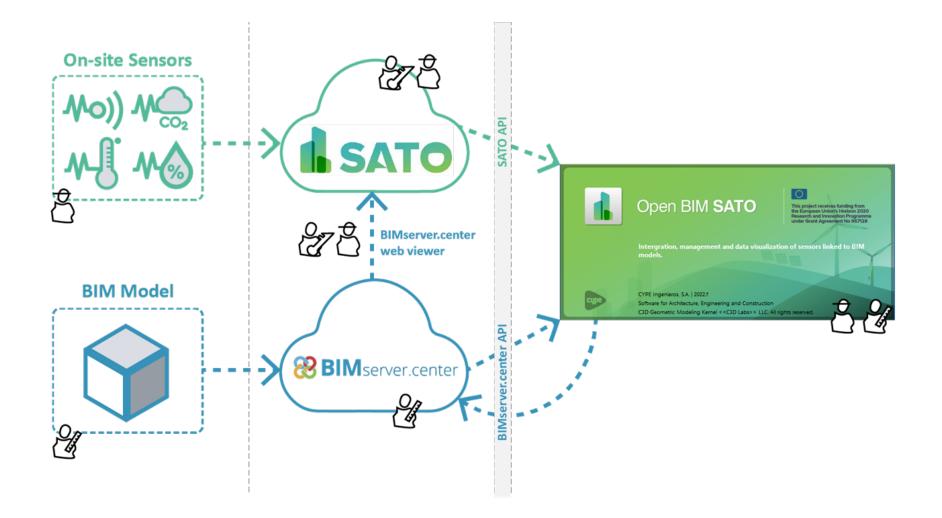




Digital Twin



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 or contact us at

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