



UNIVERSITA' DEGLI STUDI DI NAPOLI FEDERICO II

Dipartimento di Ingegneria Civile, Edile e Ambientale (DICEA)

Riprogettazione integrata e sostenibile dell'edilizia esistente

Arkeda 04/12/2021 - Napoli

Antonio Salzano, PhD

Università di Napoli Federico II

TECNOLOGIE A SUPPORTO DELLA PROGETTAZIONE INTEGRATA



TRADITIONAL FLOW OF INFORMATION (DOCUMENTS)

Trying to keep all parties in the loop on a project has become increasingly complicated

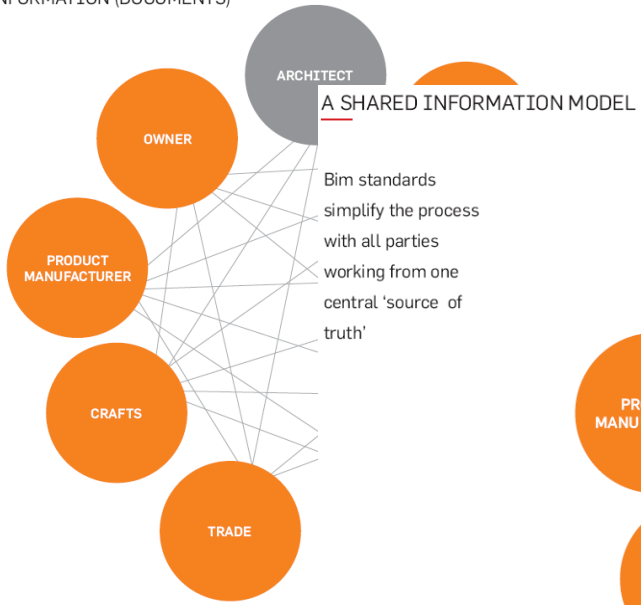


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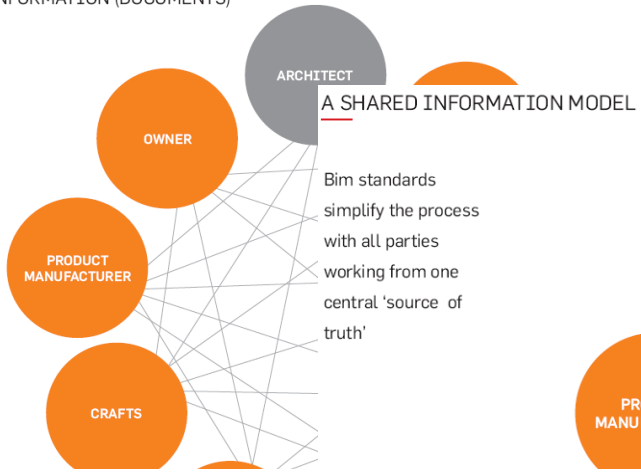


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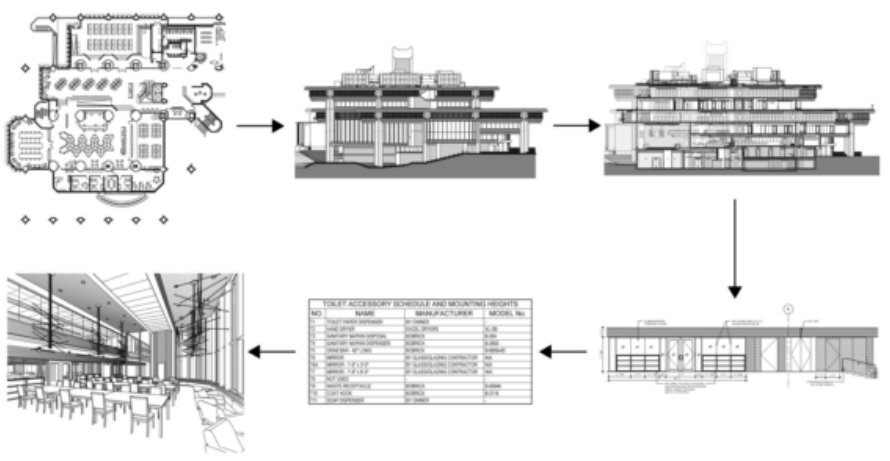


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CAD PROJECT

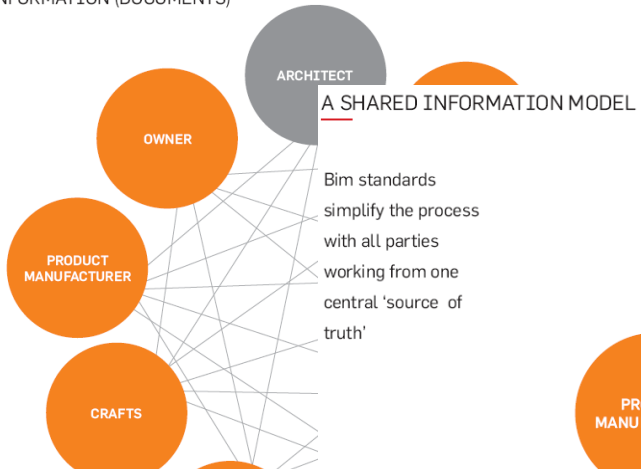


TECNOLOGIE A SUPPORTO DELLA PROGETTAZIONE INTEGRATA

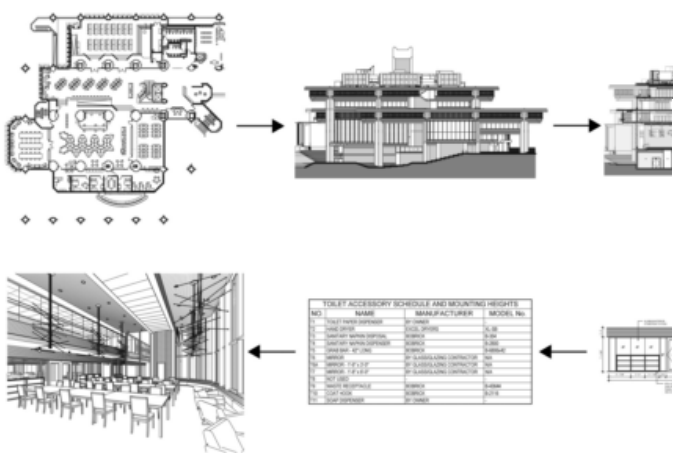


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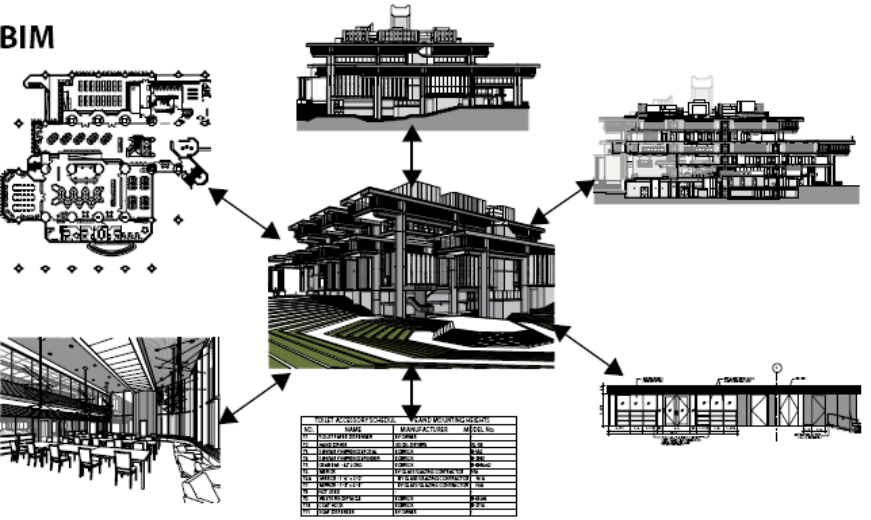
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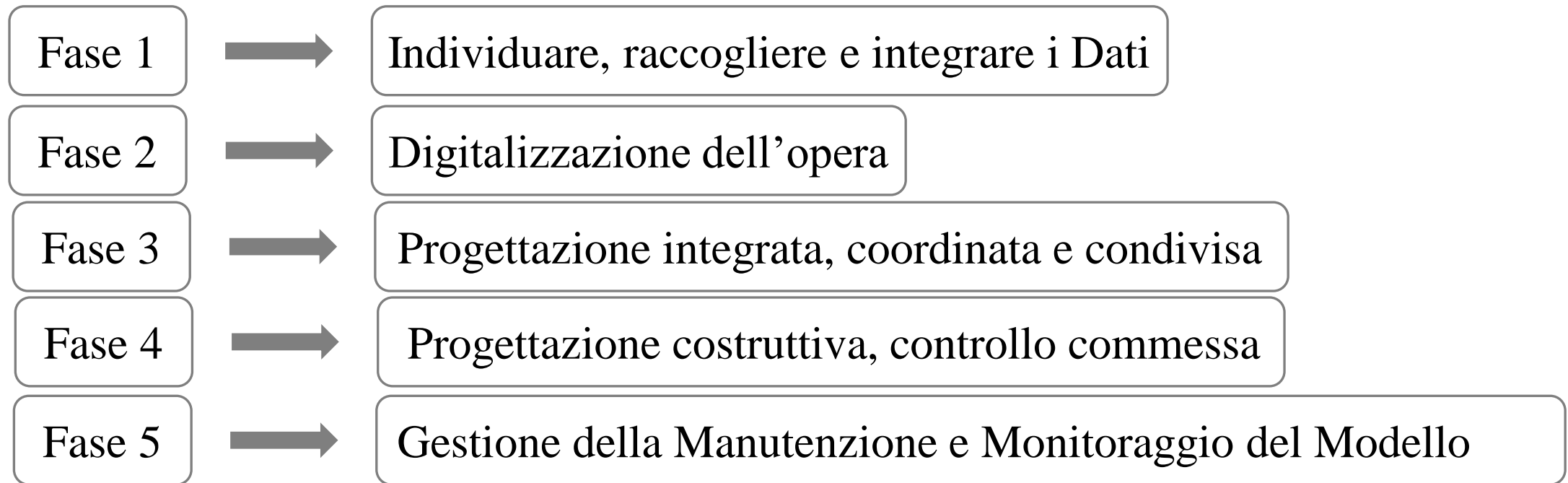
CAD PROJECT



BIM

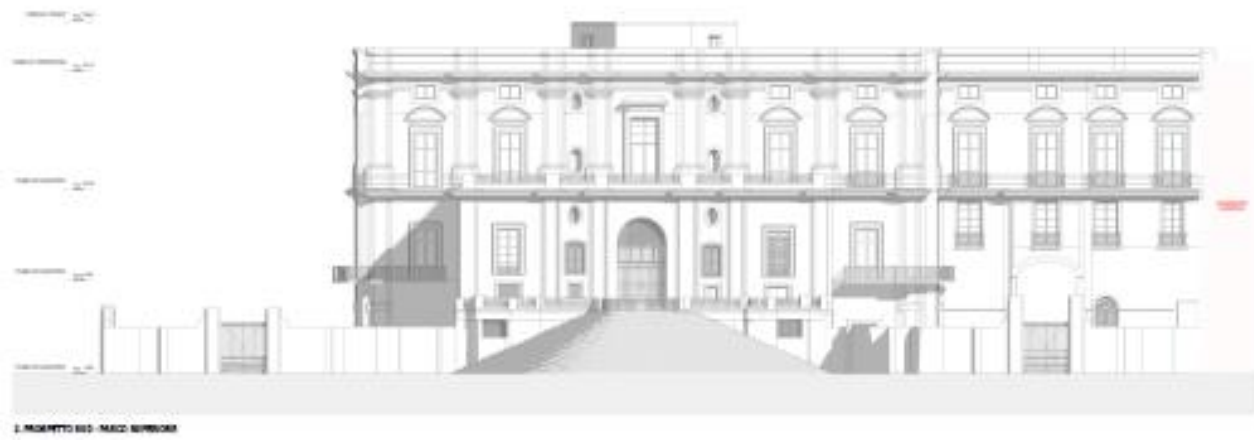
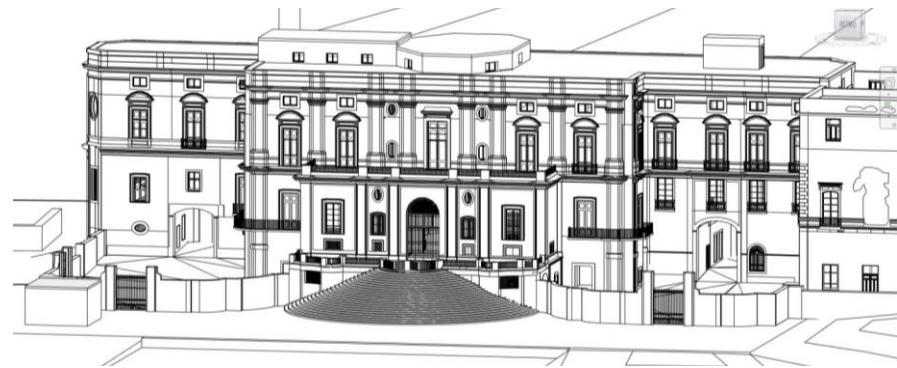
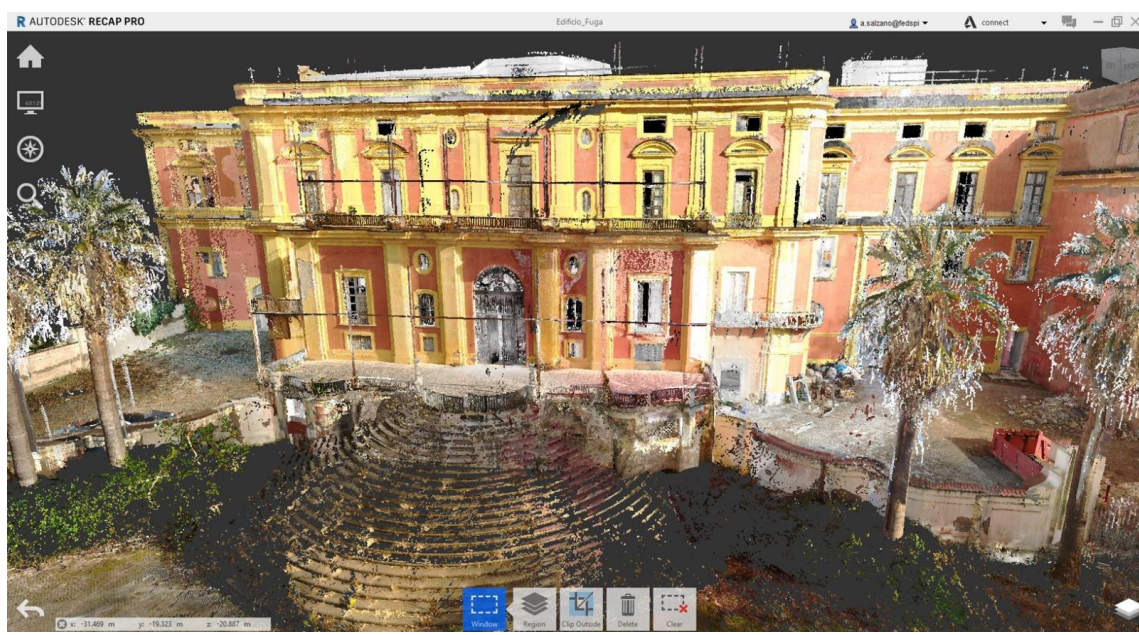


Definizione di un Processo per le opere esistenti



TECNOLOGIE A SUPPORTO DELLA PROGETTAZIONE INTEGRATA

FASE 1: INDIVIDUAZIONE, RACCOLTA DATI



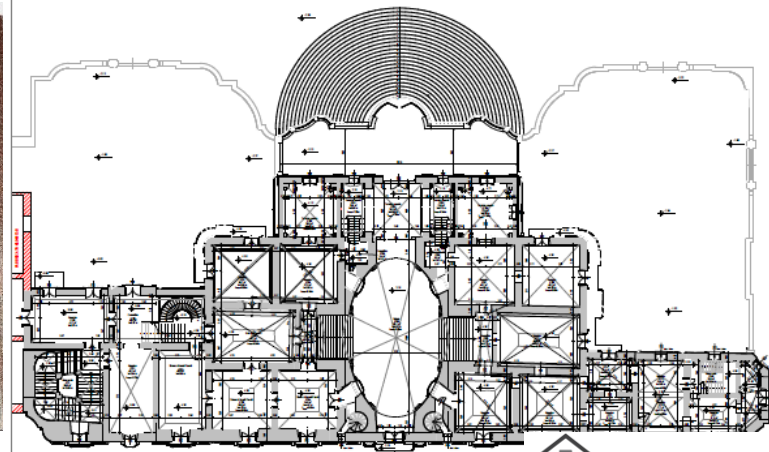
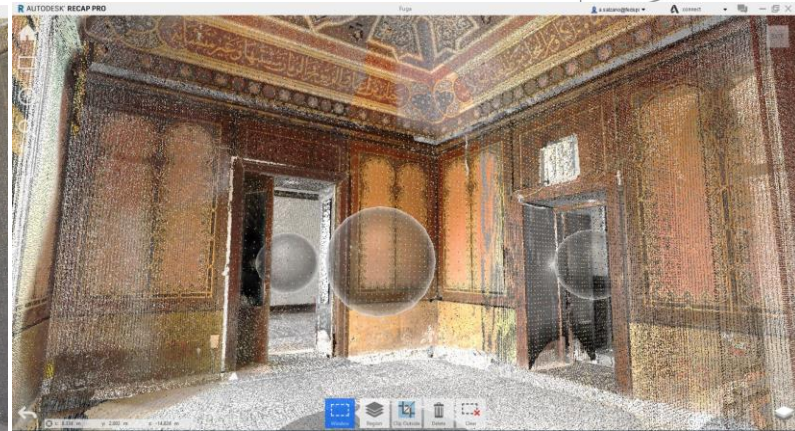
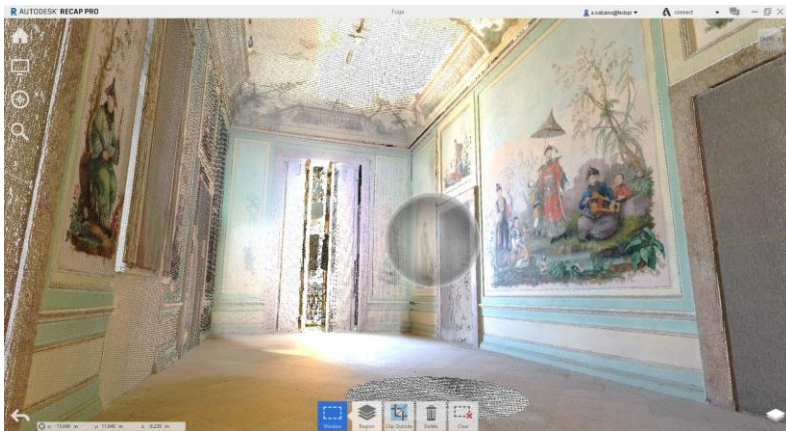
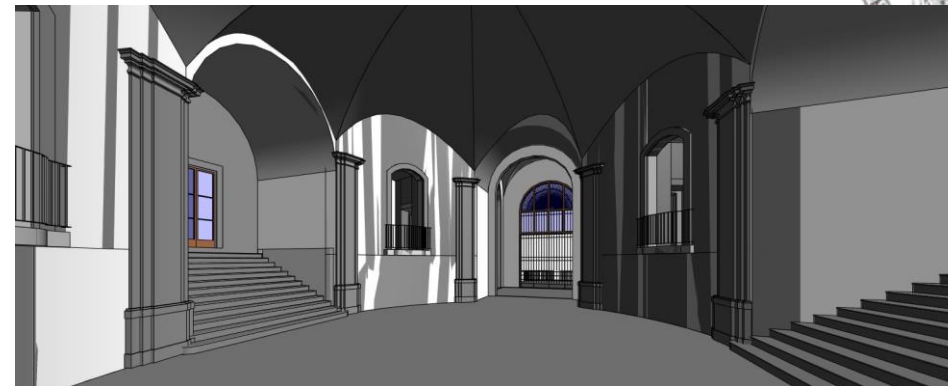
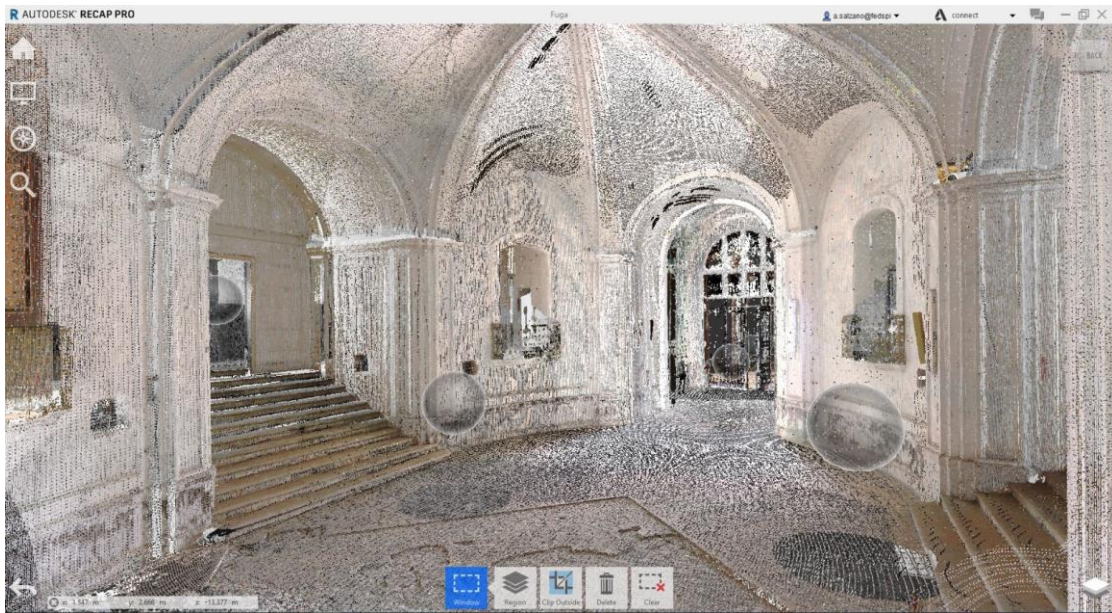
Attività di rilievo laser scanner e restituzione BIM di Villa Favorita di Ercolano – Agenzia del Demanio – Attività condotta da





TECNOLOGIE A SUPPORTO DELLA PROGETTAZIONE INTEGRATA

FASE 1: INDIVIDUAZIONE, RACCOLTA DATI

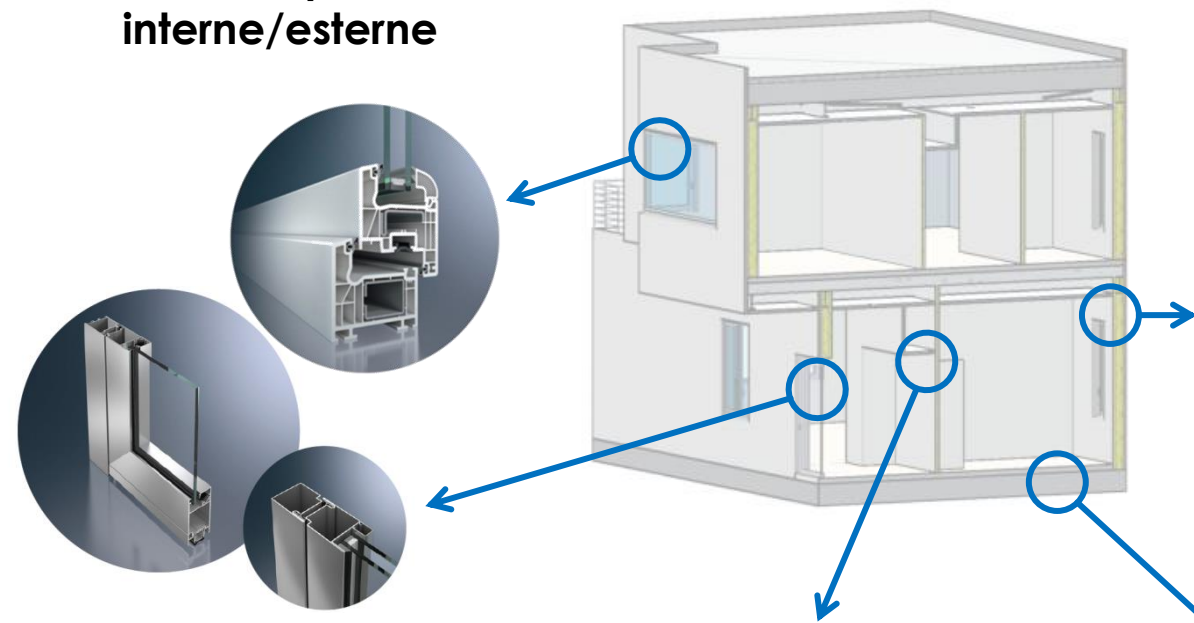


Attività di rilievo laser scanner e restituzione BIM di Villa Favorita di Ercolano – Agenzia del Demanio – Attività condotta da

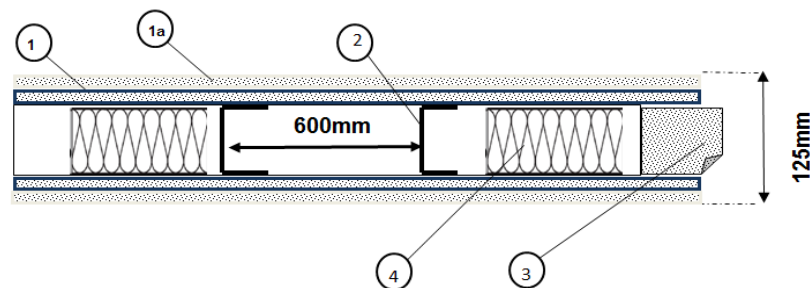
TECNOLOGIE A SUPPORTO DELLA PROGETTAZIONE INTEGRATA

FASE 2: DIGITALIZZAZIONE DELL'OPERA

Infissi e porte interne/esterne

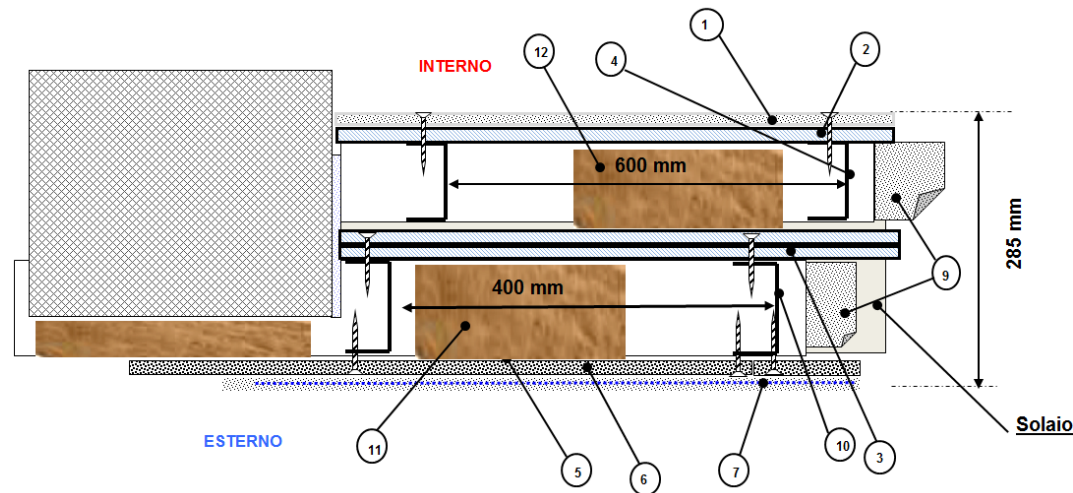


Pareti interne



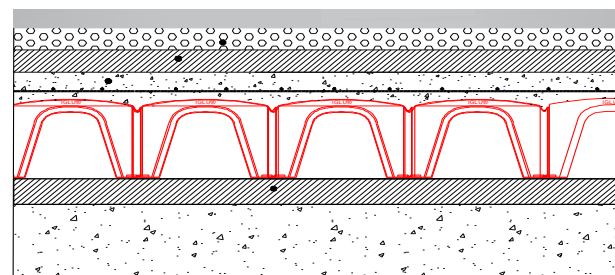
- 1 LASTRE KNAUF DIAMANT 12,5 mm
- 1a LASTRE KNAUF KASA 12,5 mm
- 2 Montante C75x50 sp. 0,6 mm interasse 600 mm
- 3 Nastro in Neoprene
- 4 Singolo pannello KNAUF EKOVIETRO P sp.60mm

Pareti esterne



- 1 LASTRA KNAUF KASA 12,5mm
- 2 LASTRA KNAUF GKB con B.V. 12,5mm
- 3 DOPPIA LASTRA KNAUF GKB 12,5mm
- 4 Montante C 100/50 sp 0,6 interasse 600 mm
- 5 Tessuto Tyvek
- 6 Aquapanel Outdoor sp 12,5
- 7 Exterior Basecoat + Exterior Reinforcing Mesh
- 9 Nastro in neoprene
- 10 Montante MGZ C 100/50 sp 6/10 mm interasse 400
- 11 Lana Minerale sp 80 mm Knauf Isoroccia70-DP7
- 12 Lana Minerale sp 100 mm Knauf Mineral Wool 35

Sottotondo: vespaio areato



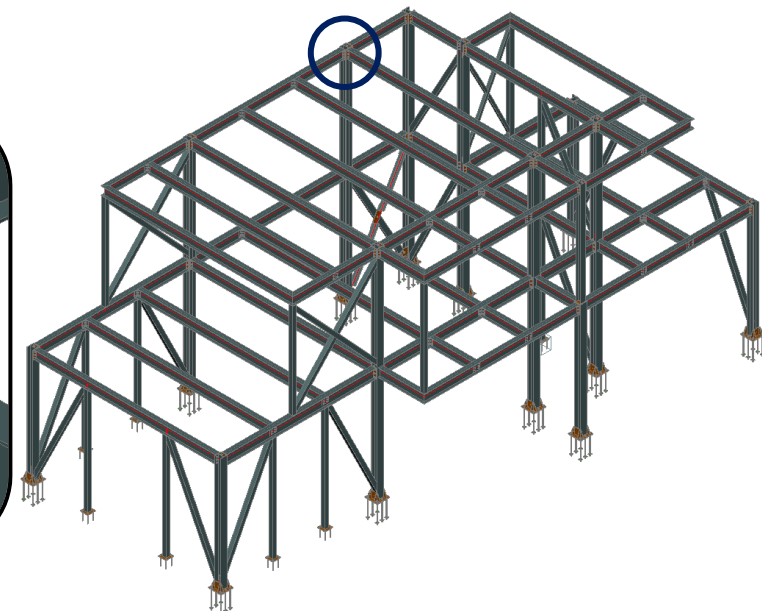
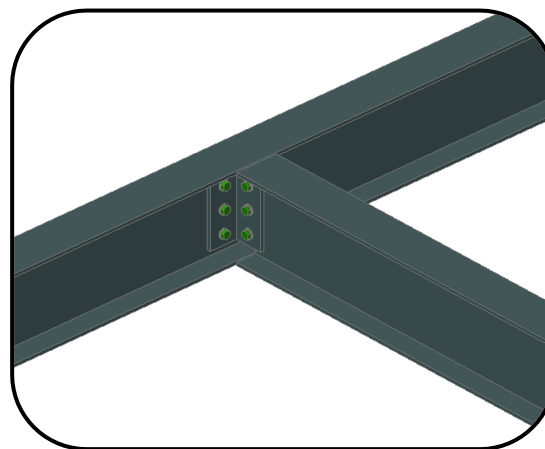
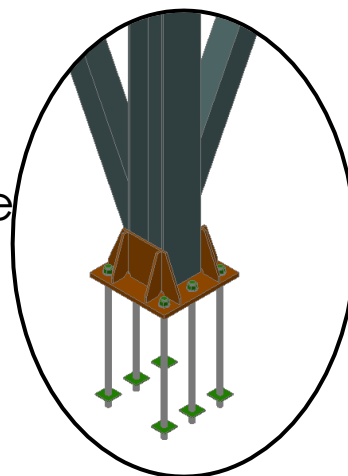
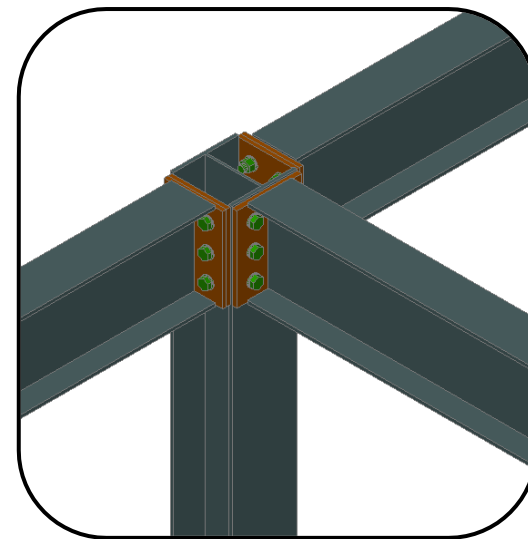
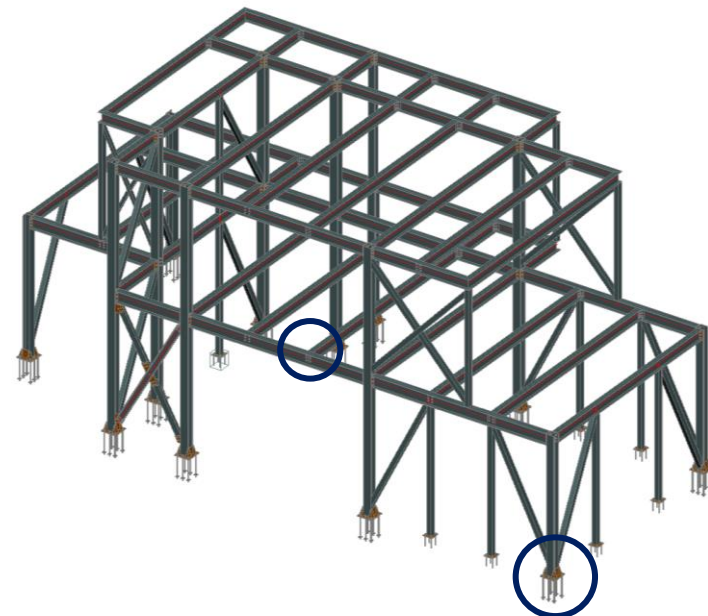
- 1 MASSETTO ARMATO E PAVIMENTAZIONE
- 2 PANNELLO POLISTIRENE ESTRUSO
- 3 MASSETTO ALLEGGERITO
- 4 SOLETTA IN CLS ARMATO
- 5 ELEMENTO IGLU®
- 6 MASSETTO IN CLS MAGRO
- 7 MATERIALE INERTE COMPATTATO



TECNOLOGIE A SUPPORTO DELLA PROGETTAZIONE INTEGRATA

FASE 2: DIGITALIZZAZIONE DELL'OPERA

IL MODELLO 3D



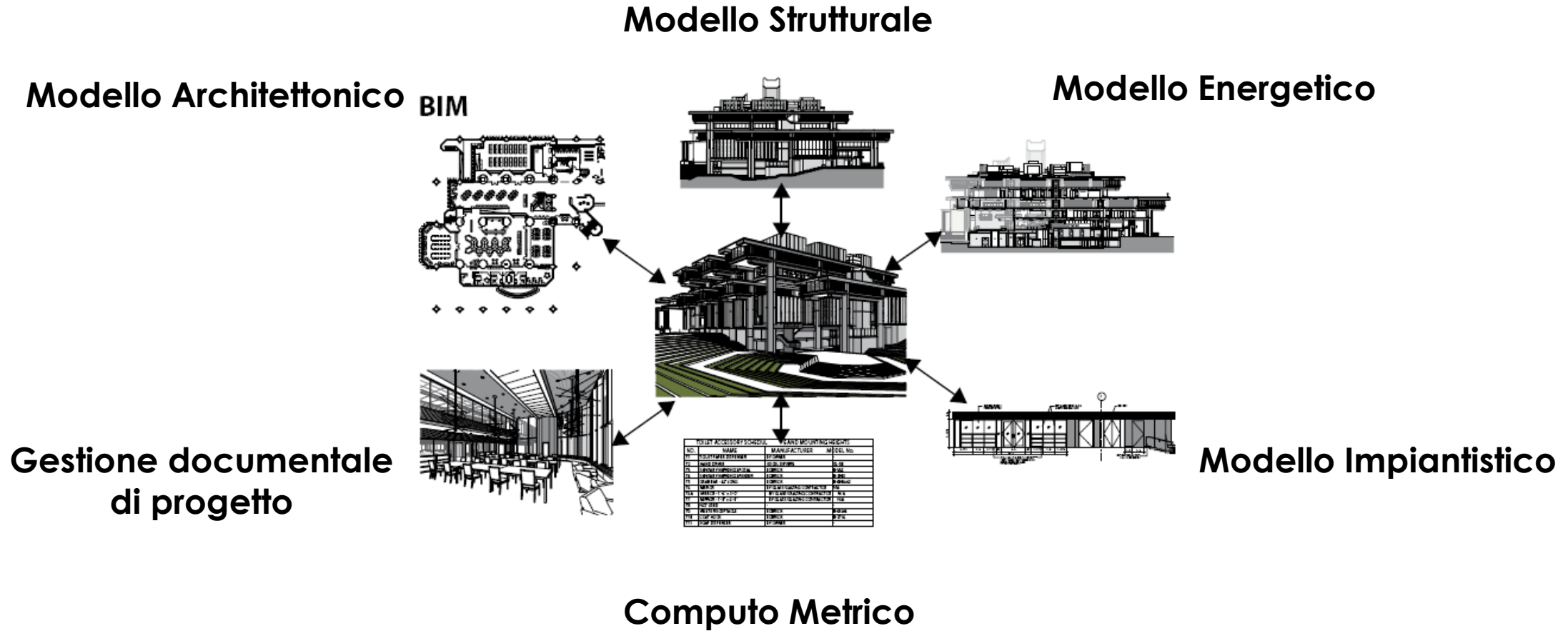
Il modello si interfaccia con il software **BIM AUTHORIZING** per una sovrapposizione perfetta dello strutturale e dell'architettonico

Offrire una visione concreta e realistica di quello che sarà realizzato in cantiere



TECNOLOGIE A SUPPORTO DELLA PROGETTAZIONE INTEGRATA

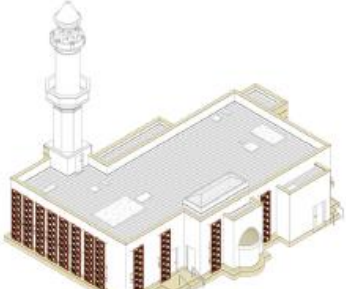
FASE 2: DIGITALIZZAZIONE DELL'OPERA






TECNOLOGIE A SUPPORTO DELLA PROGETTAZIONE INTEGRATA

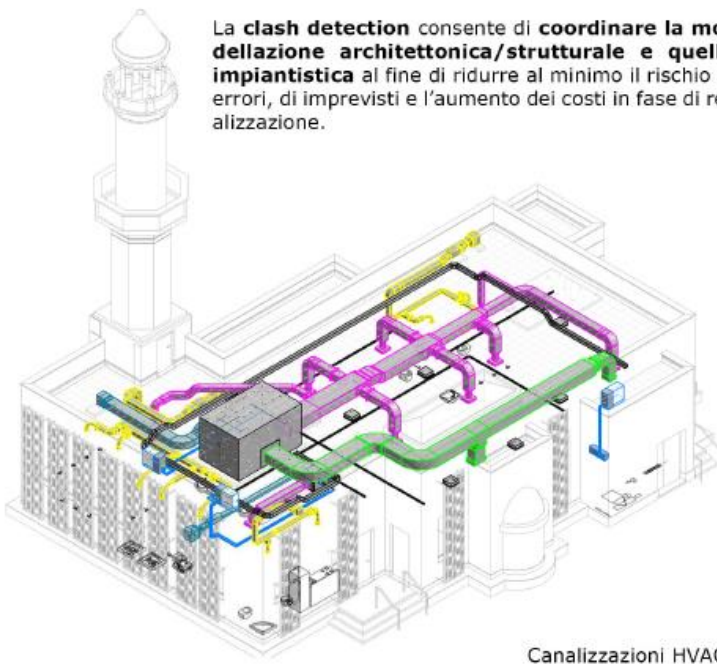
FASE 3: PROGETTAZIONE INTEGRATA, COORDINATA E CONDIVISA



Modello architettonico

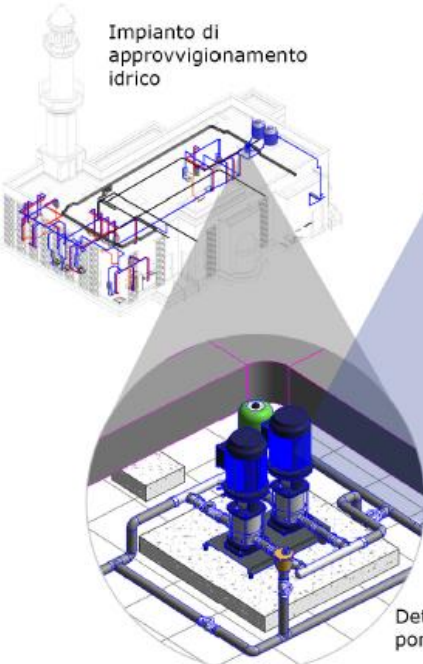


Impianto di drenaggio




Canalizzazioni HVAC

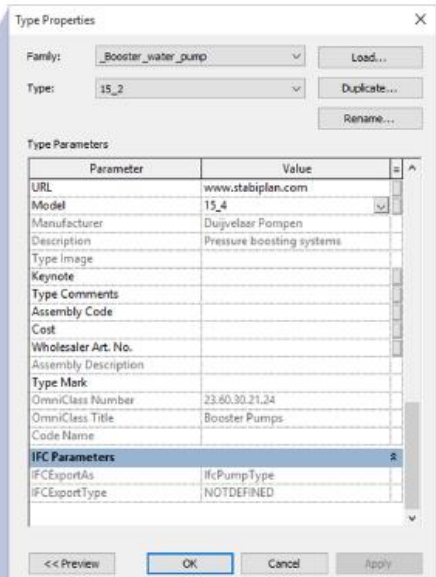
La **clash detection** consente di **coordinare la modellazione architettonica/strutturale e quella impiantistica** al fine di ridurre al minimo il rischio di errori, di imprevisti e l'aumento dei costi in fase di realizzazione.



Impianto di approvvigionamento idrico



Dettaglio pompa idrica

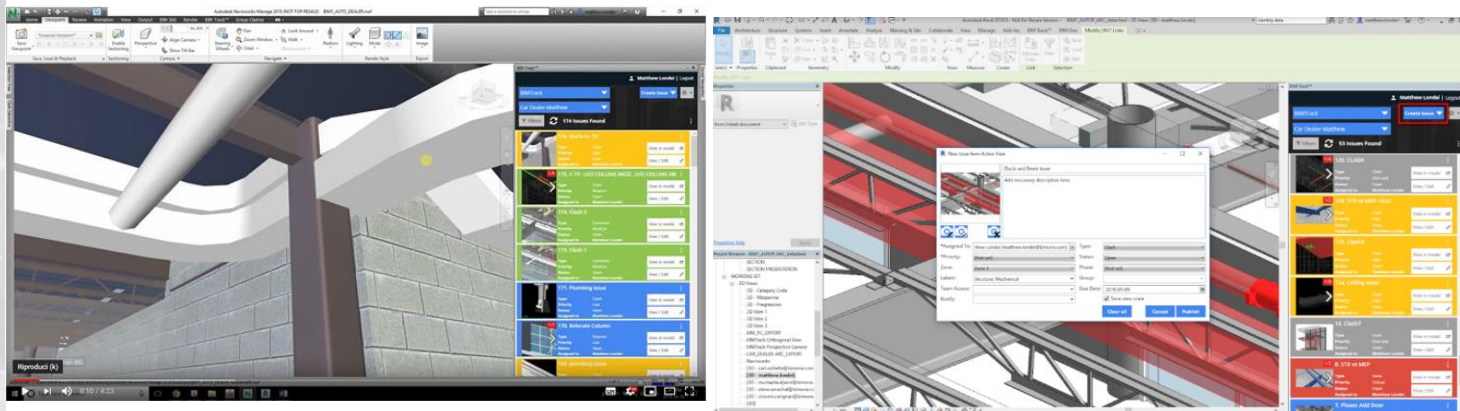


Individuazione di alcuni dei parametri associati alle famiglie

The Evolution of Digital Coordination

Low → Efficiency level → High

2009	2010	2011-2013	2014	2015-Now
 Manual coordination review by emails	 Clash detection PDF reports	 Model based view exchange	 BCF file exchange	 Cloud based issue management



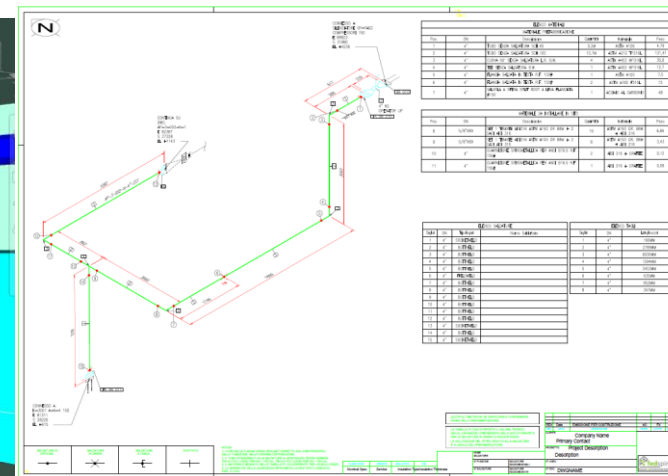
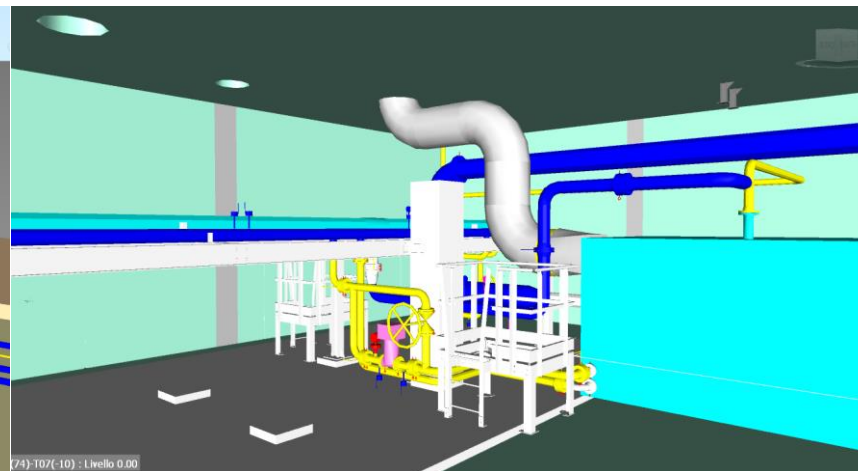
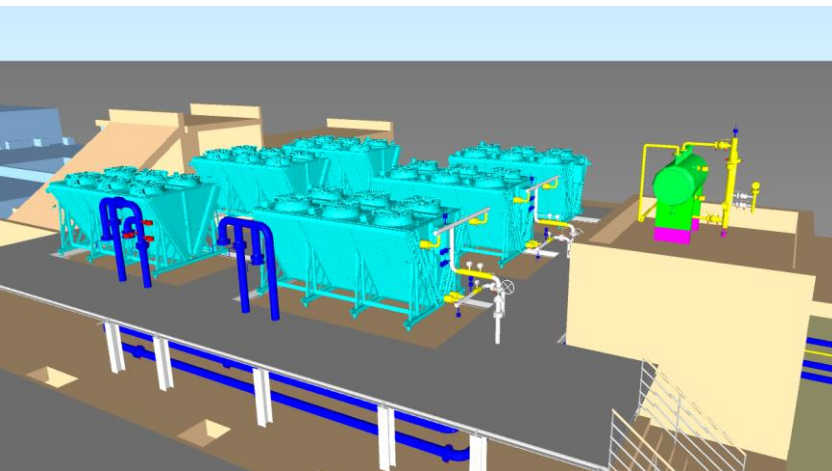
Attività di progettazione esecutiva in BIM delle discipline impiantistiche – Hamad Port Doha – Attività condotta da





TECNOLOGIE A SUPPORTO DELLA PROGETTAZIONE INTEGRATA

FASE 4: PROGETTAZIONE COSTRUTTIVA E CONTROLLO COMMESSA

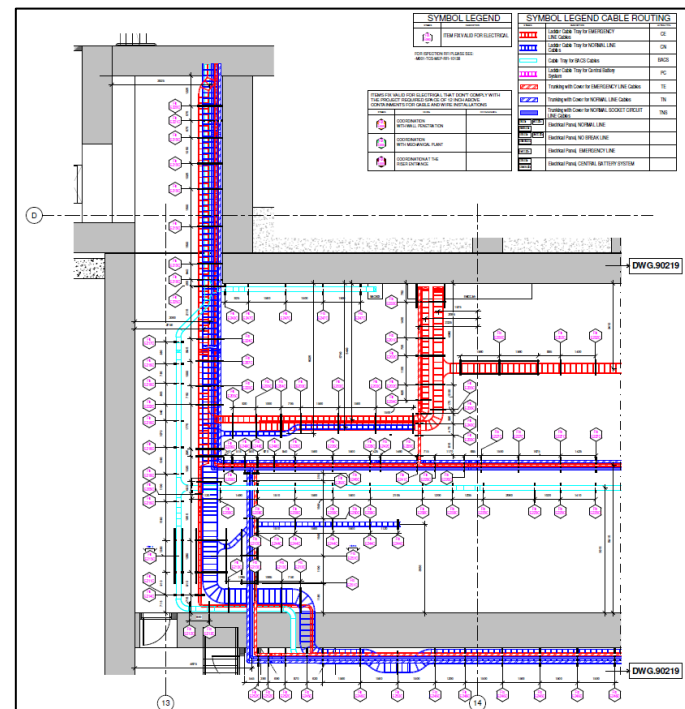
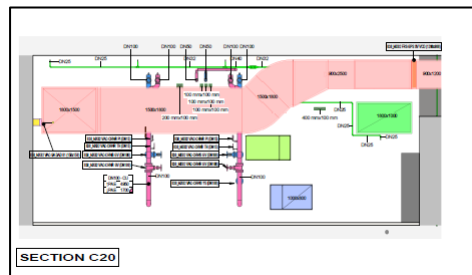
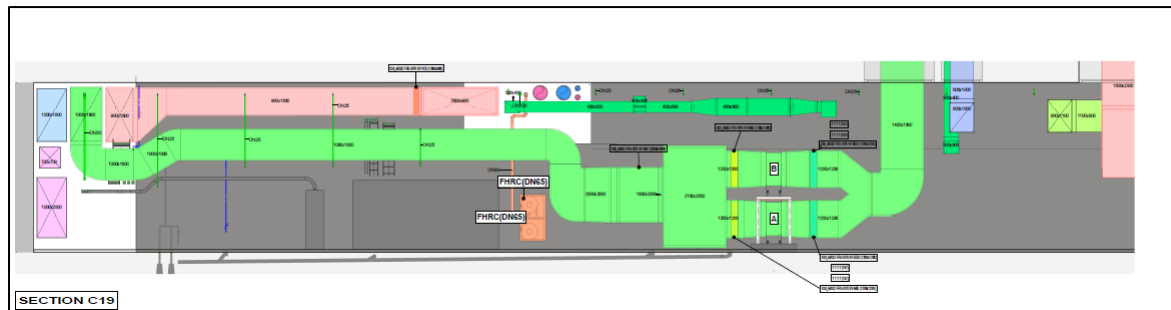
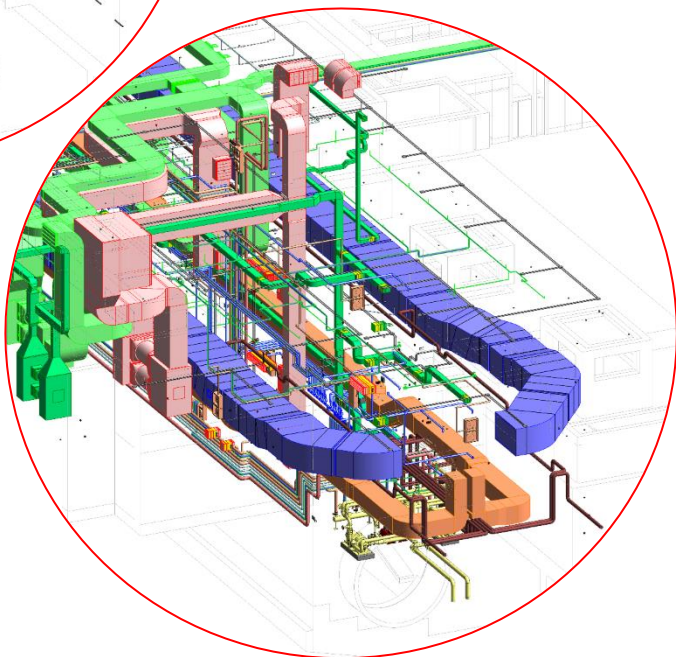
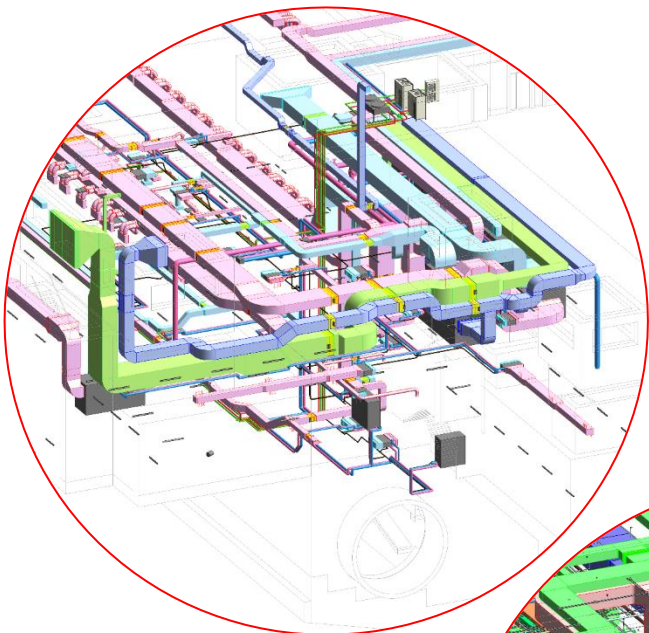


Attività di progettazione costruttiva in BIM delle discipline impiantistiche – MOSE – Attività condotta da



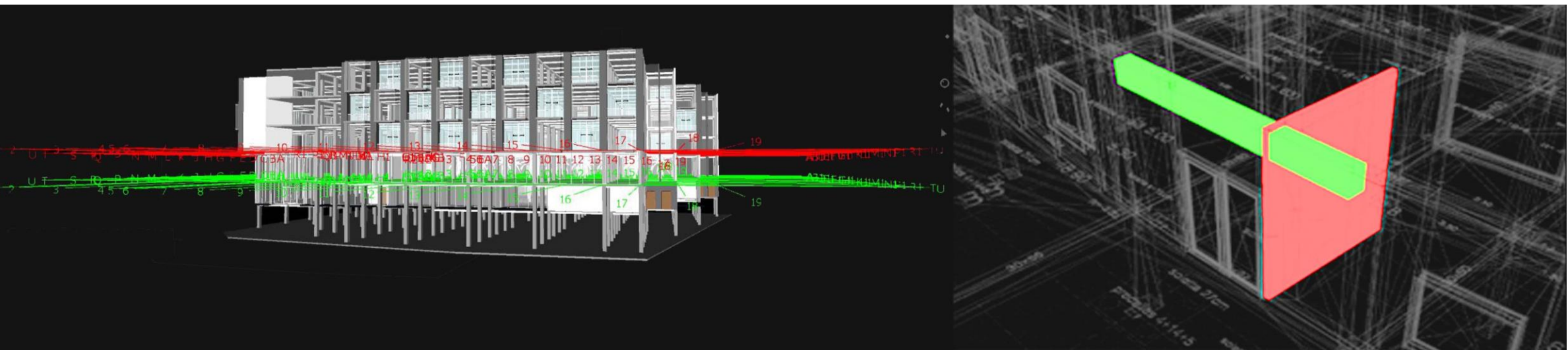
TECNOLOGIE A SUPPORTO DELLA PROGETTAZIONE INTEGRATA

FASE 4: PROGETTAZIONE COSTRUTTIVA E CONTROLLO COMMESSA



TECNOLOGIE A SUPPORTO DELLA PROGETTAZIONE INTEGRATA

FASE 4: PROGETTAZIONE COSTRUTTIVA E CONTROLLO COMMessa

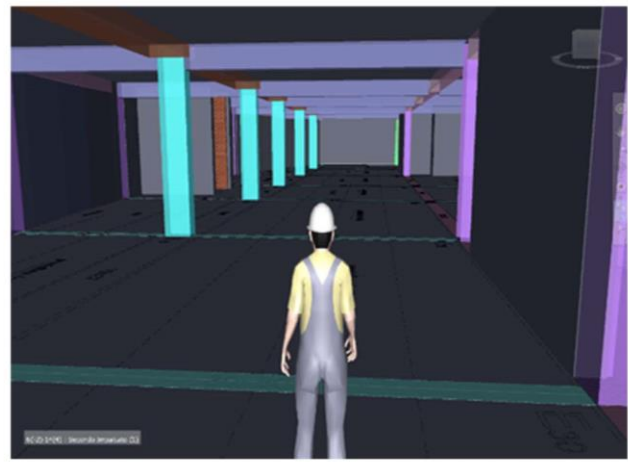


3D PARAMETRIC MODEL

CLASH DETECTION:
ARCHITECTURAL- STRUCTURAL-MEP

Material Quantity Take-Off							
Level	Family and Type	Material Name	Material Cost	Material Embodied CO2	Material Area	Material Vol	Total Cost
Ground Floor	Floor: Timber Suspended Floor	Wood Sheathing, Chipboard	€24.56		67 m²	1.47 m³	€1645.14
Ground Floor	Floor: Timber Suspended Floor	Structure, Timber Joist/Rafter Layer	€7.79		67 m²	15.07 m³	€521.81
First Floor	Basic Ceiling: Generic	Gypsum Wall Board	€28.04	0.00	65 m²	0.00 m³	€1810.55
First Floor	Basic Ceiling: Generic	Gypsum Wall Board	€28.04	0.00	64 m²	0.00 m³	€1807.19
First Floor	Floor: Timber Suspended Floor	Wood Sheathing, Chipboard	€24.56		67 m²	1.47 m³	€1645.14
First Floor	Floor: Timber Suspended Floor	Structure, Timber Joist/Rafter Layer	€7.79		67 m²	15.07 m³	€521.81
B1010375: 6					397 m²	33.09 m³	€7951.64
	Basic Roof: Cold Roof - Timber	Wood	€0.00	0.00	90 m²	2.26 m³	€0.00
	Basic Roof: Cold Roof - Timber	Structure, Timber Truss Joist/Rafter	€12.49	0.00	90 m²	13.56 m³	€1128.93
	Basic Roof: Cold Roof - Timber	Roofing, Tile	€66.01	0.00	90 m²	3.43 m³	€5966.45
	Basic Roof: Cold Roof - Timber	Roofing Felt	€5.83	0.00	90 m²	0.00 m³	€526.96
Loft	Floor: Roof Ceiling Joist	Structure, Timber Joist/Rafter Layer	€7.79		67 m²	6.70 m³	€521.81
B1020400: 5					429 m²	25.95 m³	€8144.15
	Basic Wall: Ext - 215 - Brick	Brick, Common	€87.59		54 m²	11.43 m³	€4712.52
	Basic Wall: Ext - 215 - Brick	Plaster	€10.77		54 m²	1.08 m³	€580.77
	Basic Wall: Ext - 215 - Brick	Brick, Common	€87.59		42 m²	9.11 m³	€3709.69
	Basic Wall: Ext - 215 - Brick	Plaster	€10.77		42 m²	0.85 m³	€456.14
	Basic Wall: Ext - 215 - Brick	Brick, Common	€87.59		49 m²	10.34 m³	€4267.18
	Basic Wall: Ext - 215 - Brick	Plaster	€10.77		49 m²	0.98 m³	€525.98
	Basic Wall: Ext - 215 - Brick	Brick, Common	€87.59		39 m²	8.43 m³	€3433.69
	Basic Wall: Ext - 215 - Brick	Plaster	€10.77		39 m²	0.78 m³	€422.20
B2010100: 6					368 m²	42.98 m³	€18108.17

AUTOMATIC QUANTITY TAKEOFF AND
COST ESTIMATION



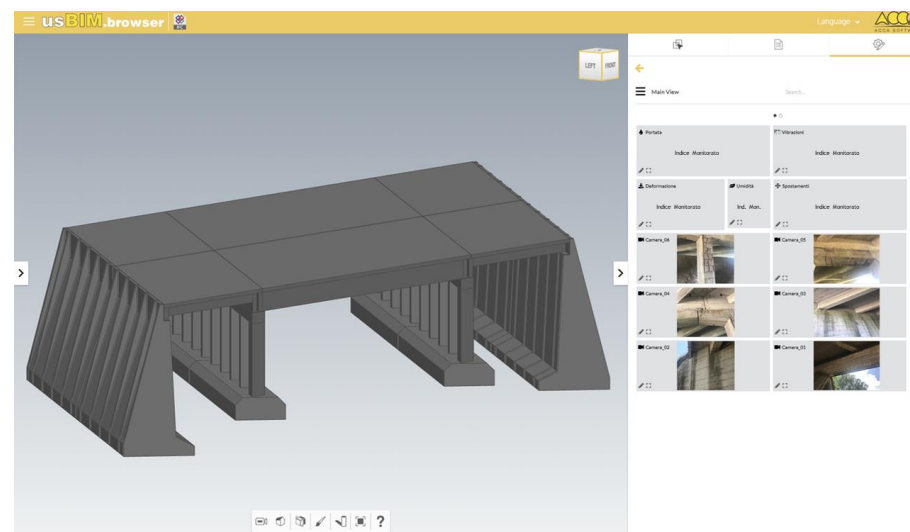
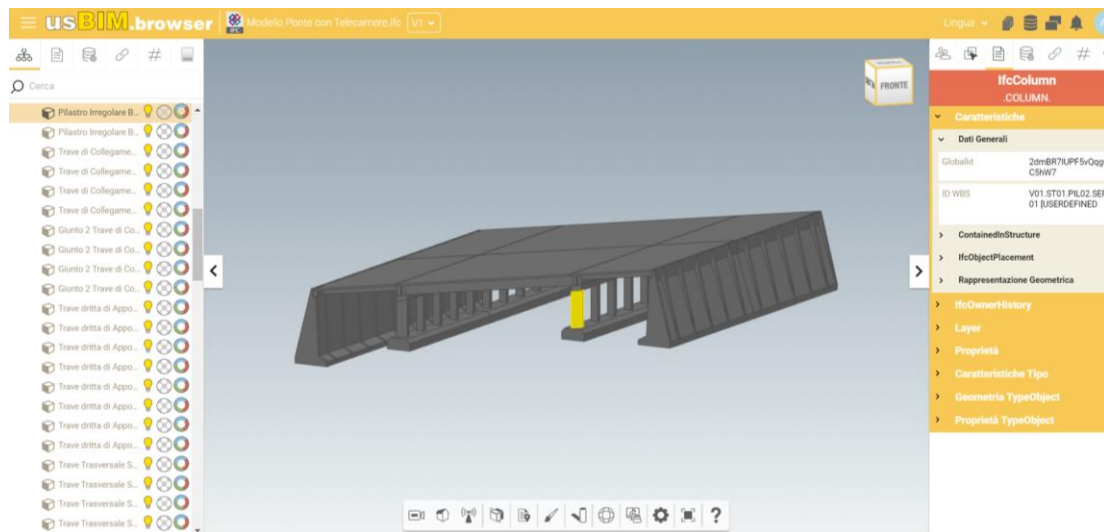
DIGITAL MODEL WALKTHROUGH



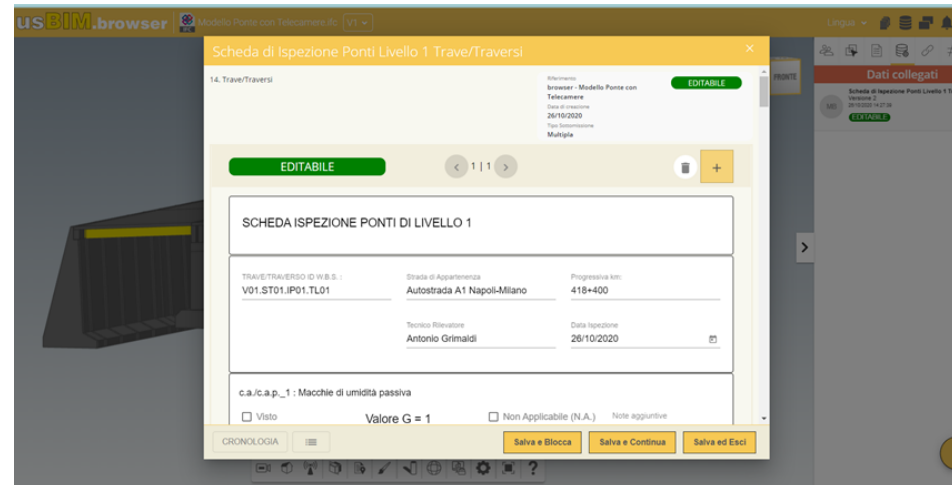
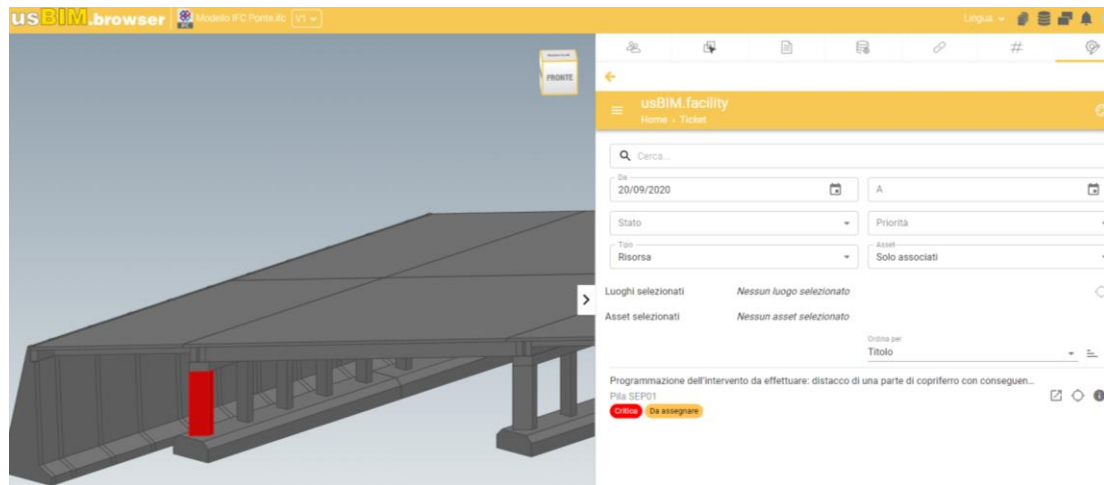
TECNOLOGIE A SUPPORTO DELLA PROGETTAZIONE INTEGRATA

FASE 5: GESTIONE DELLA MANUTENZIONE E MONITORAGGIO DEL MODELLO

MONITORAGGIO DEI DATI DI MODELLO



GESTIONE DEGLI ALERT E DELLE OPERAZIONI DI MANUTENZIONE

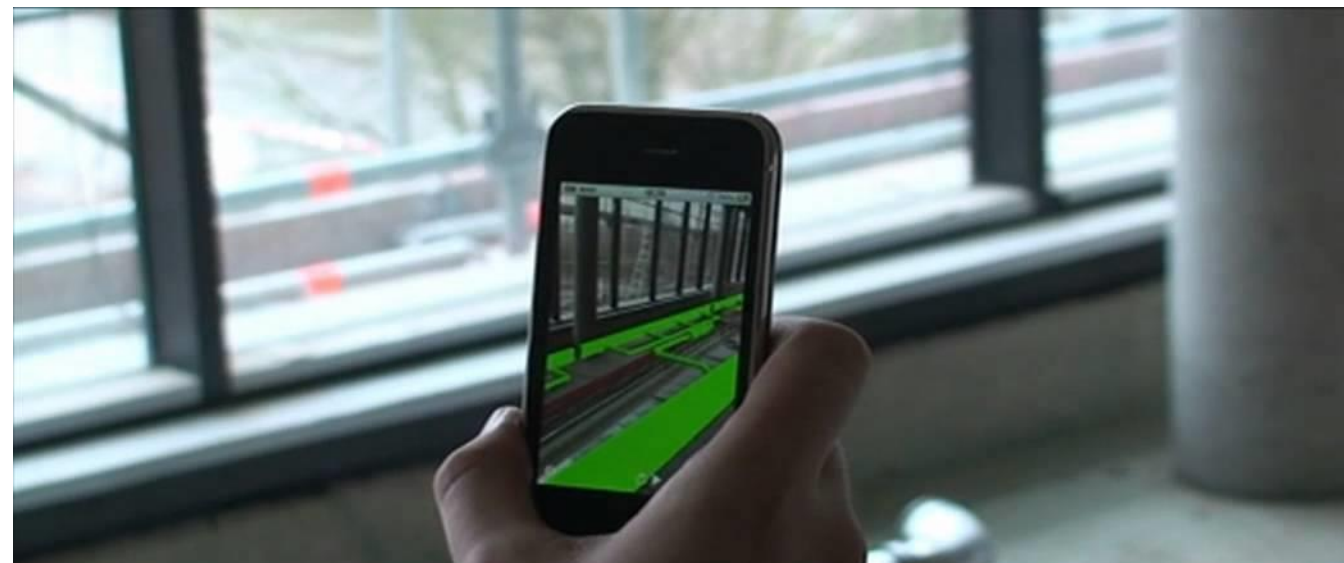


Attività di ricerca condotta dal Dipartimento di Ingegneria Civile, Edile e Ambientale (DICEA) dell'Università di Napoli Federico II



TECNOLOGIE A SUPPORTO DELLA PROGETTAZIONE INTEGRATA

AUGMENTED REALITY





TECNOLOGIE A SUPPORTO DELLA PROGETTAZIONE INTEGRATA

AUGMENTED REALITY





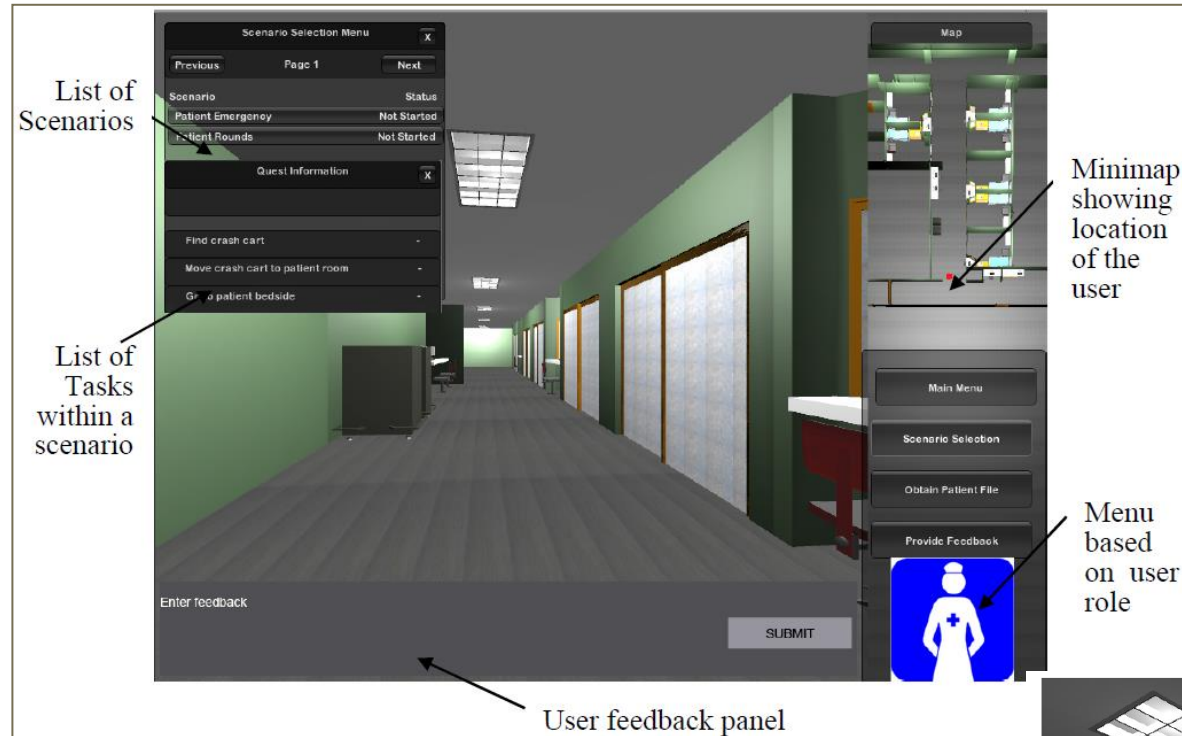
TECNOLOGIE A SUPPORTO DELLA PROGETTAZIONE INTEGRATA

AUGMENTED REALITY



TECNOLOGIE A SUPPORTO DELLA PROGETTAZIONE INTEGRATA

EXPERIENCE BASED DESIGN



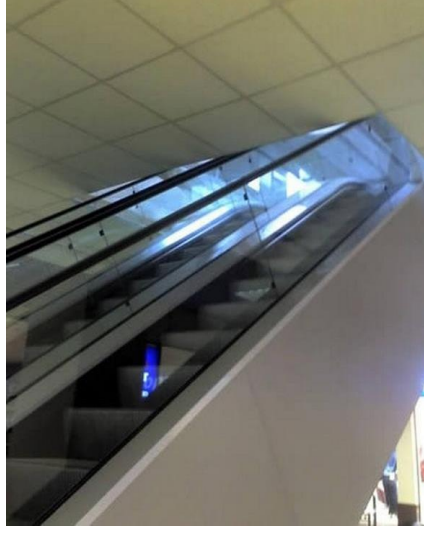
Kumar, Sonali, et al. "Developing an experienced-based design review application for healthcare facilities using a 3d game engine." *Journal of Information Technology in Construction* (2011): 85-104.



WHY USE BIM?



WHY ^{USE} BIM?





GRAZIE PER
L'ATTENZIONE

antonio.salzano@unina.it