BIM nelle fasi iniziali dei processi d'intervento edilizio

La simulazione computazionale per la redazione del progetto di fattibilità tecnica ed economica.

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UNIVERSITÀ DEGLI STUDI FIRENZE

DIDA DIPARTIMENTO DI ARCHITETTURA

MAILAB.BIZ

1

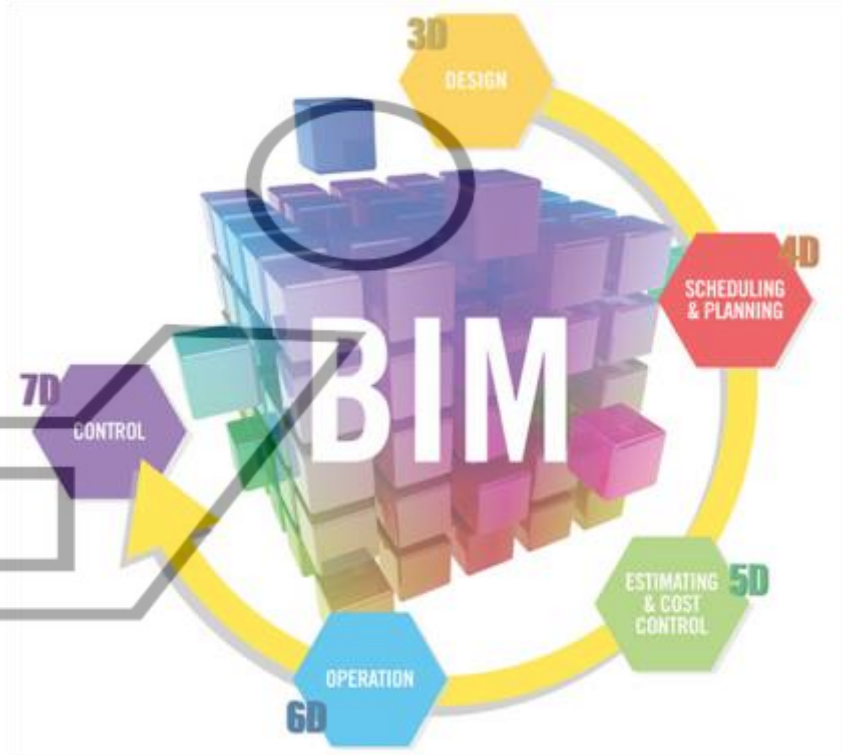
The PERFORMATIVE BIM & PROGRAMMA EDILIZIO

BIM Overview & Model Based Performance Simulation
Dinamic Space Programming & Lay Out Definition

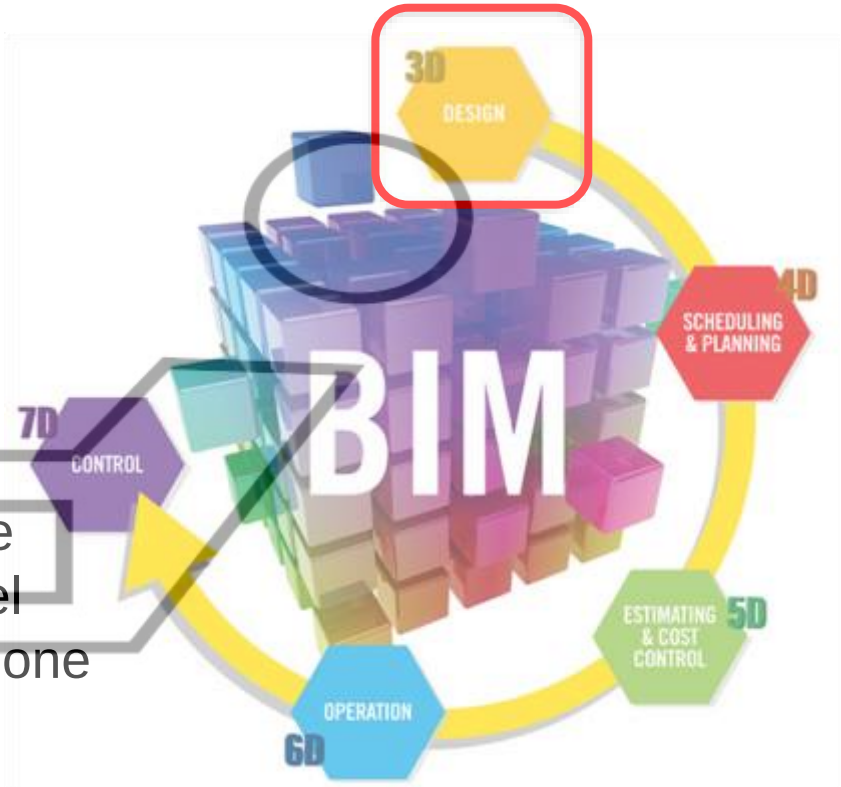
BIM Overview & Model Based Performance Simulation


Ricostruire il contesto 3D
Piano fattibilità e dibattito pubblico
BIM
Cantiere e costruzione
Progettazione definitiva ed esecutiva

INFORMATIVE BIM
VS
PERFORMATIVE BIM



INFORMATIVE BIM VS PERFORMATIVE BIM



Ovvero
come la modellazione computazionale può essere usata per la definizione del progetto nelle sue fasi iniziali di ideazione

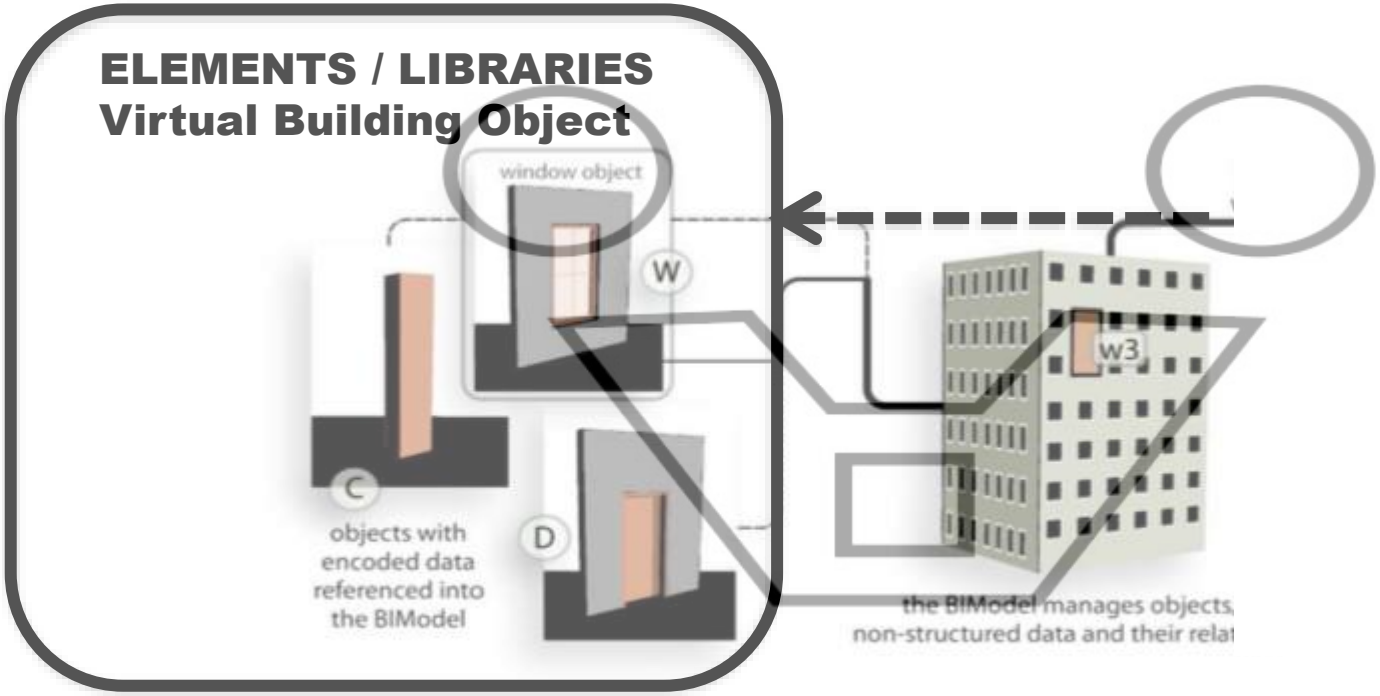
BIM

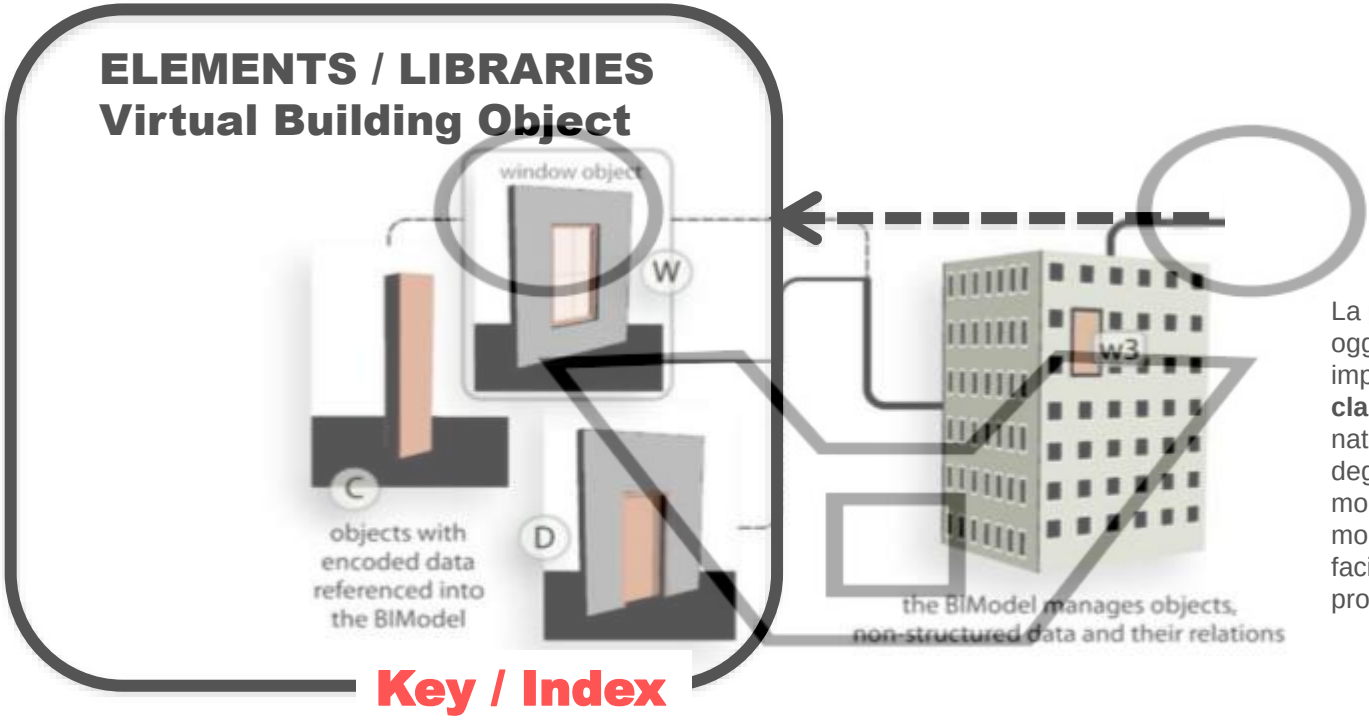
BUILDING a usually roofed and walled structure assembling materials for permanent/temporary use

INFORMATION: entity or form that resolves uncertainty related to data and kowledge as data represents values attributed to parameters, and knowledge signifies understending of real or abstract phenomena. Discipline of telecommunication founded on mathematic with application on artifIcial intelligence, complex system , and cybernetic

MODEL: a simplified representation, a construction with cognitive and operable functions

BIM: A DATABASE

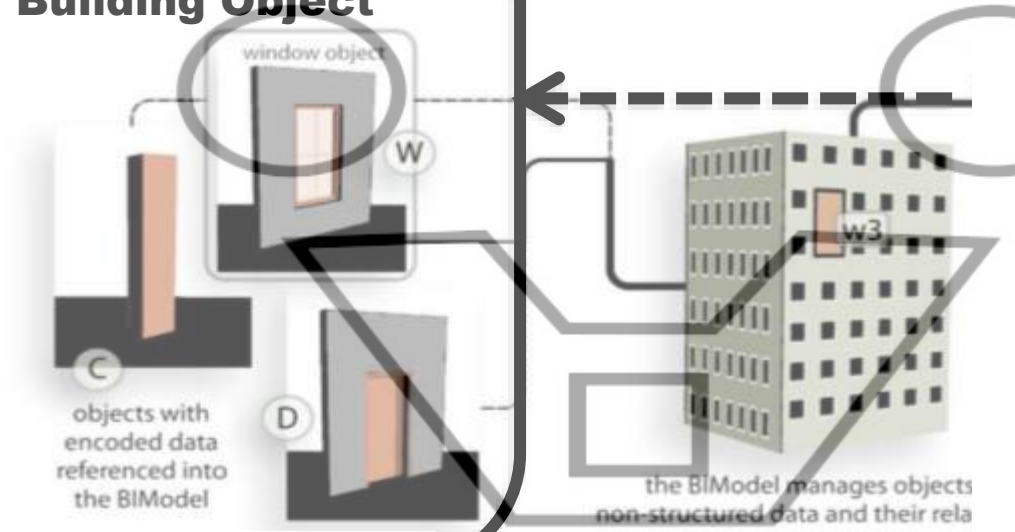




TAXONOMY

La programmazione orientata agli oggetti applicata alle costruzioni impiega un **codice organizzato per classi** che fornisce un supporto naturale alla modellazione software degli oggetti del mondo reale (o del modello astratto); ne favorisce la modularità e il riuso; permette una più facile gestione e manutenzione di progetti di grandi dimensioni.

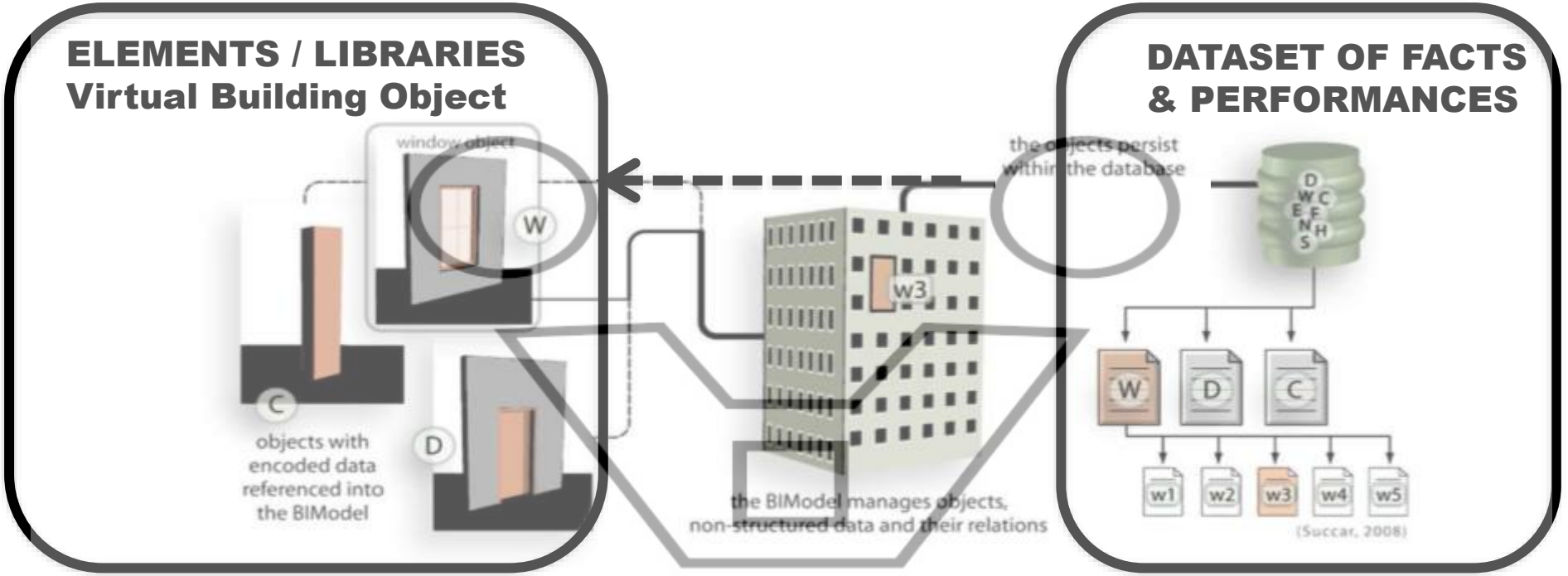
ELEMENTS / LIBRARIES
Virtual Building Object



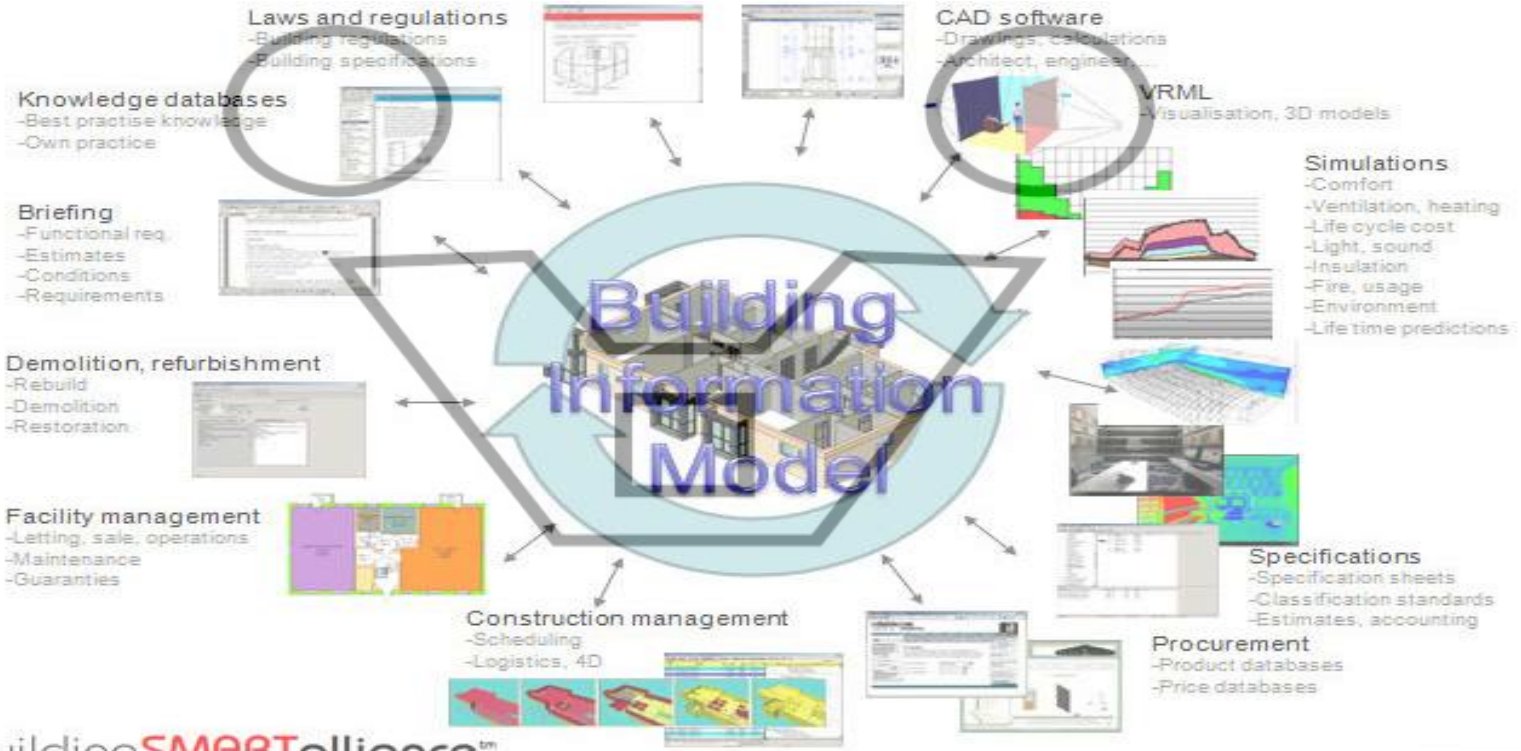
TAXONOMY

Key / Index

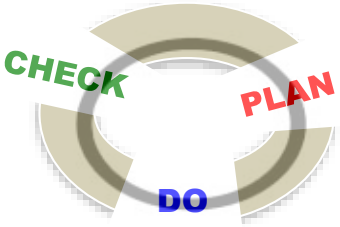
Building elements, Components, Materials, Operations,...


ELEMENTS / LIBRARIES
Virtual Building Object
window object
W
C
D
objects with encoded data referenced into the BIModel
w3
the BIModel manages objects, non-structured data and their relations
the objects persist within the database
DATASET OF FACTS & PERFORMANCES
W
D
C
w1
w2
w3
w4
w5
(Succar, 2008)

APPLICATIONS OF BIM



WHICH KIND OF INTERACTIONS DOES BIM ALLOW?

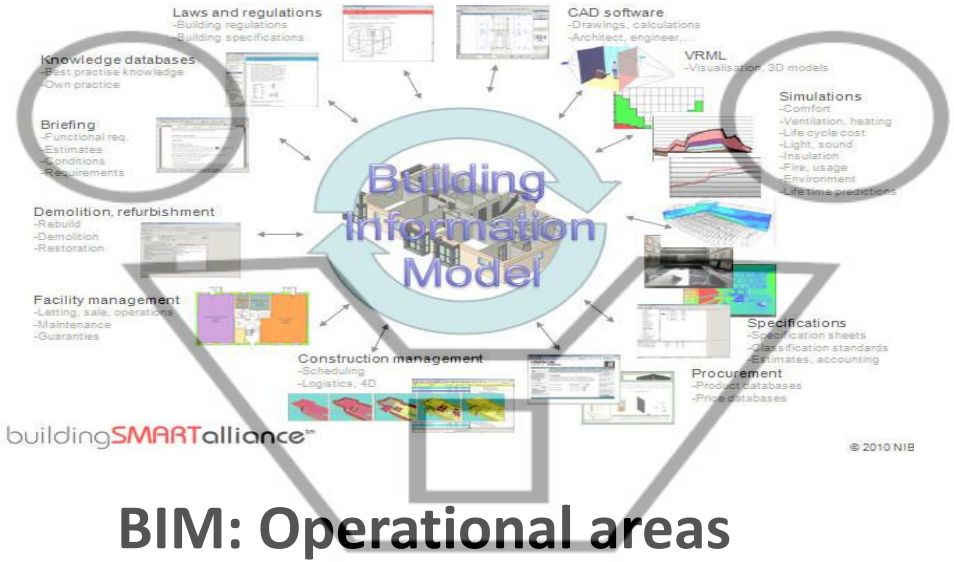


Modelling
shaping
forming
presenting,
scoping

Information
an organised
set of data:
meaningful,
actionable

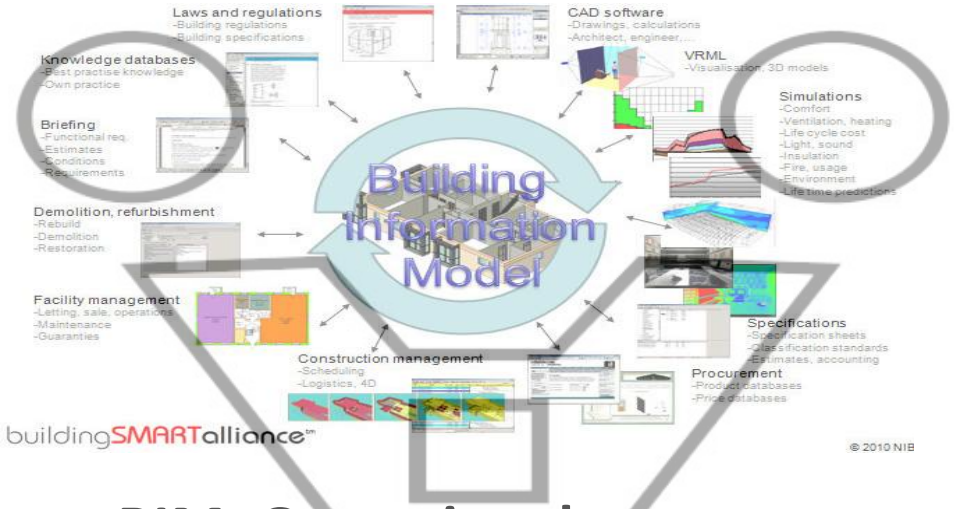
to virtualy construct a
to **extend the analysis** of a
to **explore the possibilities** of
to **study what-if scenarios** for a
to **detect possible collisions** within a
to **calculate** construction **costs** of
to **analyse constructability** of a
to **plan the deconstruction** of a
to **manage** and **maintain** a

Building
a structure, an
enclosed space,
a constructed
environment
(Succar, 2008)



BIM: Operational areas

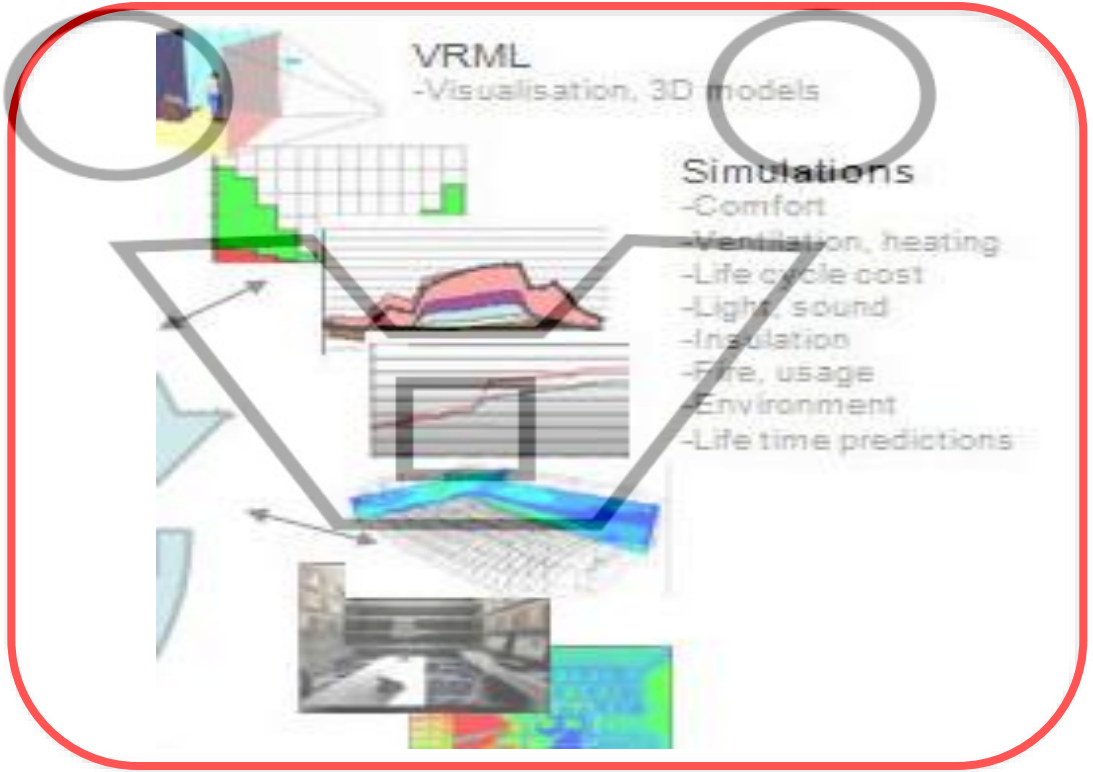
Management __ Deliverable & Communication___Simulation & Design



BIM: Operational areas

Management __ Deliverable & Communication___Simulation & Design

Building Performance Simulation



SIMULATION IS ANOTHER WAY
TO UNDERSTAND REALITY
BASED ON ABSTRACTION:

THIS ABSTRACTION IS **THE MODEL**

Building Performance Simulation

programmazione orientata agli oggetti

"… ai moduli tracciati dai compassi, alle misurazioni numeriche e poi alle equazioni matematiche si sostituiscono funzioni parametriche capaci di descrivere possibilità morfologiche e semantiche. (Kolarevic 2000: 2)

La loro formalizzazione evolve dalle strutture sintattiche del *solid modeling* e della modellazione *object-oriented* integrando archivi d'informazioni di varia natura, tipo e dimensione tra loro interattivi e operabili attraverso l'indicizzazione della rappresentazione geometrica dell'edificio

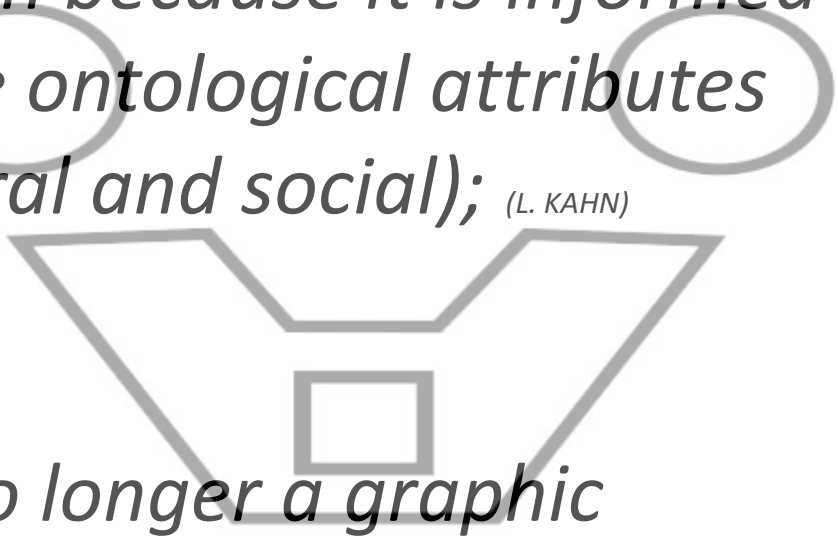
BIM

BUILDING a usually roofed and walled structure assembling materials for permanent/temporary use

INFORMATION: entity or form that resolves uncertainty related to data and kowledge as data represents values attributed to parameters, and knowledge signifies understending of real or abstract phenomena. Discipline of telecommunication founded on mathematic with application on artiflcial intelligence, complex system , and cybernetic

MODEL: a simplified representation, a construction with cognitive and operable functions

A column really knows that it is a column because it is informed of all the ontological attributes (natural and social); *(L. KAHN)*



It is no longer a graphic convention that asks to be filled with its meanings and materiality

(Levy 2012: 14).

ISOMORPHIC MODELS

Morfological Model or
"Depictional" representation

Simulation in order to understand how it looks

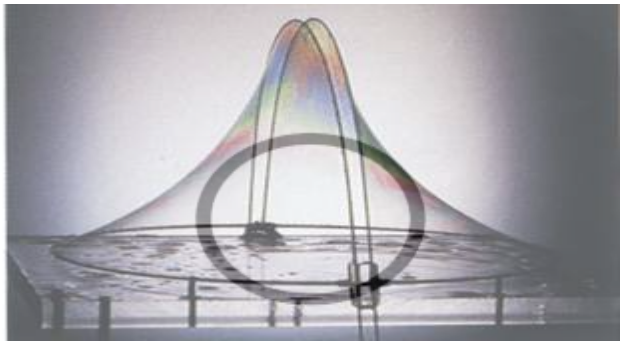
Filippo Brunelleschi, Modello ligneo Cupola del Duomo, 1420-1440 circa, Firenze, Museo dell'Opera di Santa Maria del Fiore
Ph. Antonio Quattrone

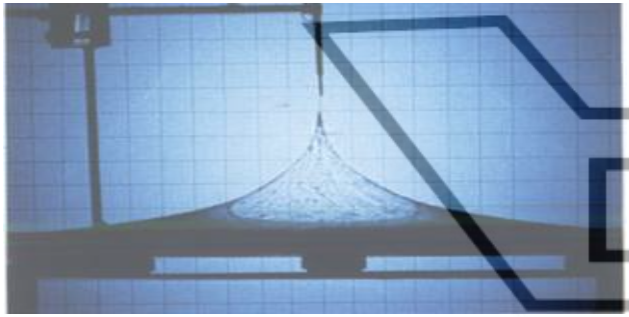
A SCALED MODEL AS AN EXPERIMENTAL SIMULATION
to understand how reality behaves

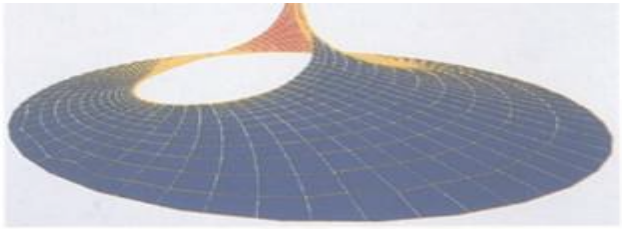
Massimo Ricci, Modello in scala della Cupola di S. Maria del Fiore in Firenze

Normally, simulation differentiate itself from experiment where experiment is conducted on reality itself, using the same matter while simulation operates through the interposition of other and different materials.

Traditionally models and simulations are mainly representative, experiments are descriptive.







VISUALIZING MATTER

Functionality and Performance Design

Frey Otto's studies & researches

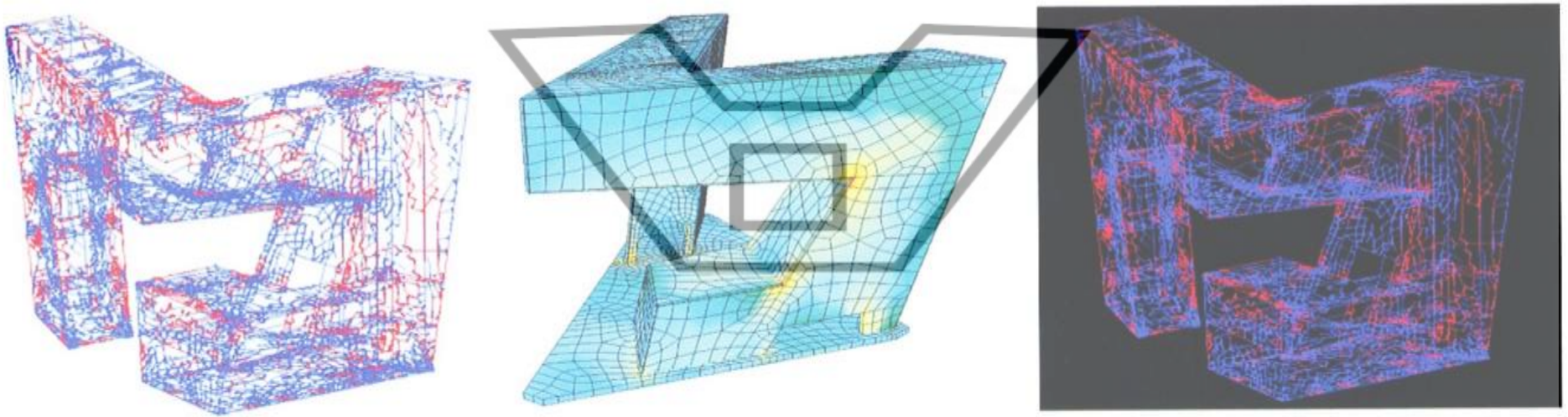
1 Soap film model of an arch-supported membrane.

2 Soap-film model of a membrane surface with rope loop as its high point.

3 Computer simulation of a minimal surface with rope loop.

DIAGRAM:
THE ABSTRACT MACHINE

..a map of relations between forces"
Deleuze, A Thousand Plateaus (1988)



AKT, South Bank Pavilion (Zaha Hadid). Load paths. © Adams Kara Taylor (AKT).


"Design is not just what it looks like and feels like. Design is how it works."
S. Jobs (1955-2011)

BUILDING PERFORMANCE SIMULATION – BPS

nasce negli anni '70 come ambito specialistico del *Parametric Modeling* (PM) e del *Performance-Based Design* (PBD)

From *what the building will look like* (Garber 2014:184),

To *What the building will work based on performance specifications* (Kolarevic 2002)

Negli ultimi venti anni **la simulazione parametrica** si è evoluta in diversi ambiti raggiungendo un soddisfacente livello di maturità soprattutto per le attività di verifica/validazione della progettazione esecutiva sino a diventare un irrinunciabile ausilio nell'ingegnerizzazione del progetto e una delle nuove frontiere del BIM come evidenziato dalla corsa delle maggiori software-house a integrare tali funzionalità all'interno dei loro prodotti.

DESIGN BASED ON DIGITAL DATA EVIDENCE

nascita di nuove 'cose'

1979

- Chip Motorola 6800 a 24 bit (in grado di computare blocchi d' informazione da 16 megabyte.)
- Nascita a Tokyo della prima rete commerciale di telefonia cellulare
- Daniel Bricklin e Robert Frankston realizzano VisiCalc

1981-1982

- Silicon Graphics (1981),
- Catia (1982),
- Tron (1982)

1992

- BIM
- the Fish (1989-1992):

1999

- Nvidia GeoForce 256

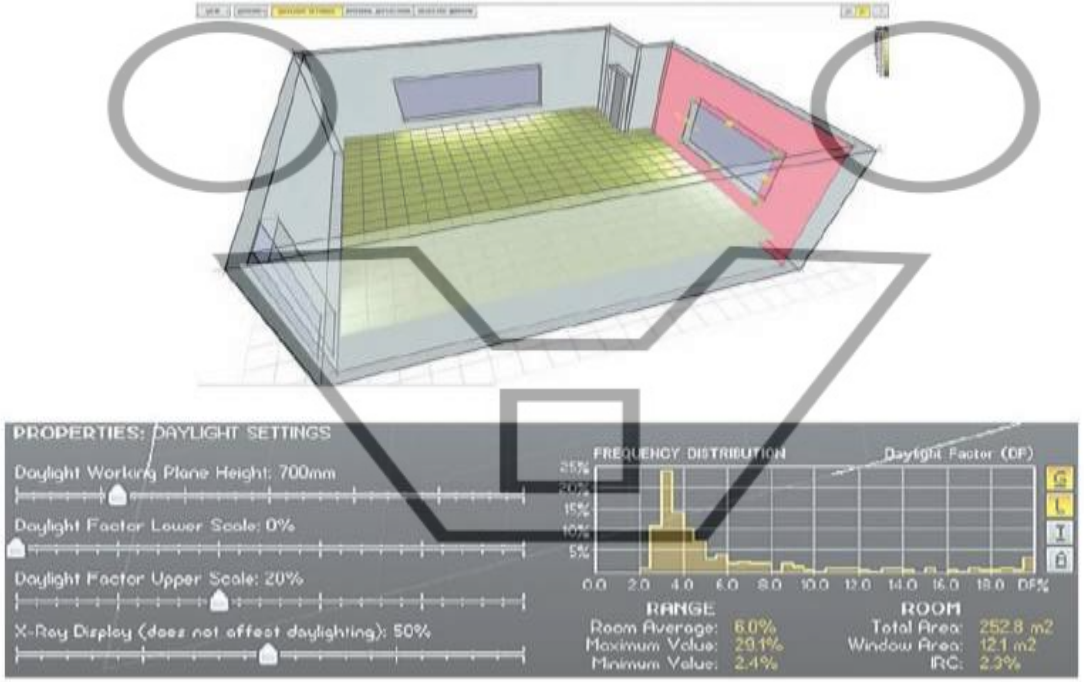
…dal kernel …alle interfacce …cloud computing ….plug-in/add-on

Conclusa una prima fase che si è concentrata sui motori di calcolo (***kernel***), l'attenzione si è spostata **sulle interfacce** con l'obiettivo di semplificare l'operabilità e la leggibilità dei risultati allo scopo di incorporare questi strumenti all'interno dei propri prodotti di modellazione BIM. Questa tendenza convive ed è alimentata dalla parallela diffusione **del *cloud-computing*** oggi sostenuta da precise logiche commerciali e da infrastrutture e protocolli telematici oggi in rapida evoluzione.

Un'altra area di sviluppo finalizzata all'integrazione si è concentrata sull'***interoperabilità***, sui protocolli d'interscambio dei dati

…. e parallelamente sulla realizzazione di un'innumerevole quantità di ***plug-in* e *add-on* dedicati a specifici aspetti della simulazione energetica e ambientale** a dimostrazione che non esiste un software in grado di risolvere tutti gli aspetti della simulazione energetica (Anderson 2014: 172).
Essi includono *l'illuminamento e la ventilazione degli ambienti interni; le prestazioni acustiche; la geometria solare e l'ombreggiamento, gli impatti dei venti, …: una vastità di strumenti che consente di condurre valutazioni di tipo prestazionale in maniera parametricamente interrelata alla geometria, ai modi occupare e usare gli ambienti, ai livelli di benessere attesi, al clima, alle caratteristiche tecnologiche della costruzione.* (Mahadavi, 2003:162).

Powerful tools for gamers



2.3 and 2.4

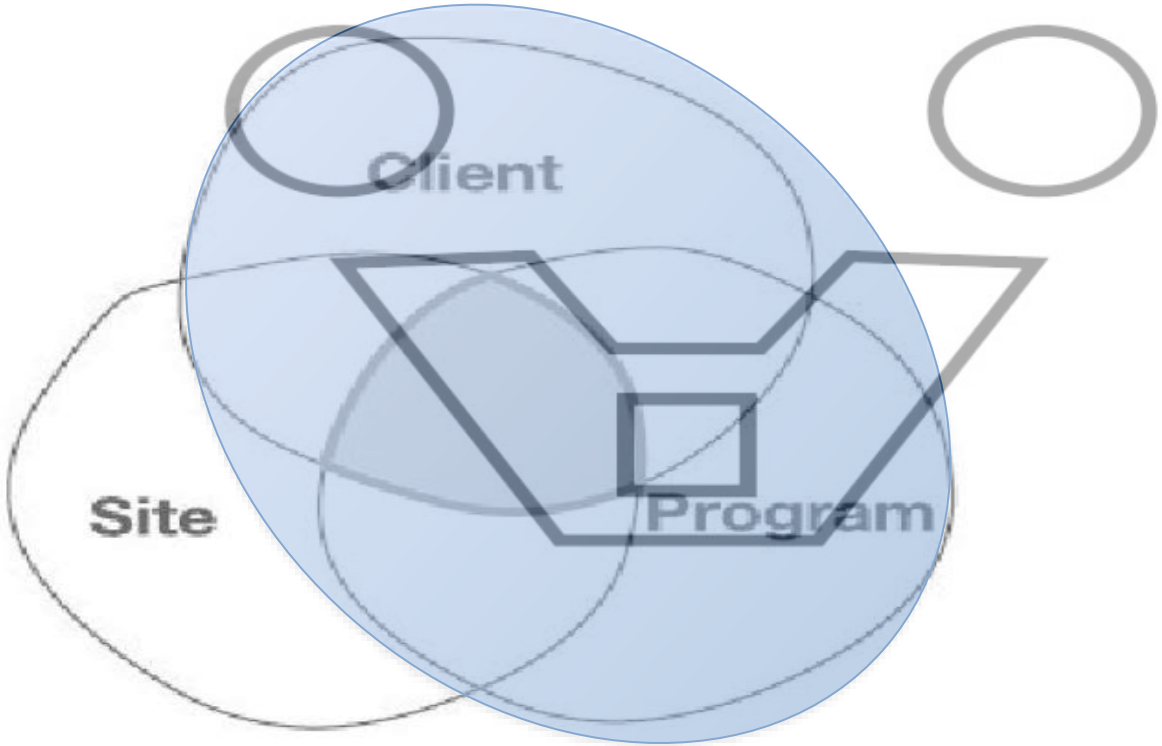
Andrew Marsh, creator of Ecotect, has been experimenting with real-time, on-line daylighting simulation. The room and windows can be adjusted to see real-time daylight factor results.

Source: Courtesy of Andrew Marsh. http://andrewmarsh.com/blog/2010/04/11/real-time-dynamic-daylighting.

PLAYING OPTIONS AND UNDERSTANDING CAUSALITY

http://andrewmarsh.com

Dinamic Space Programming & Lay Out Definition


Client
Site
Program

DEFINIRE GLI SPAZI:

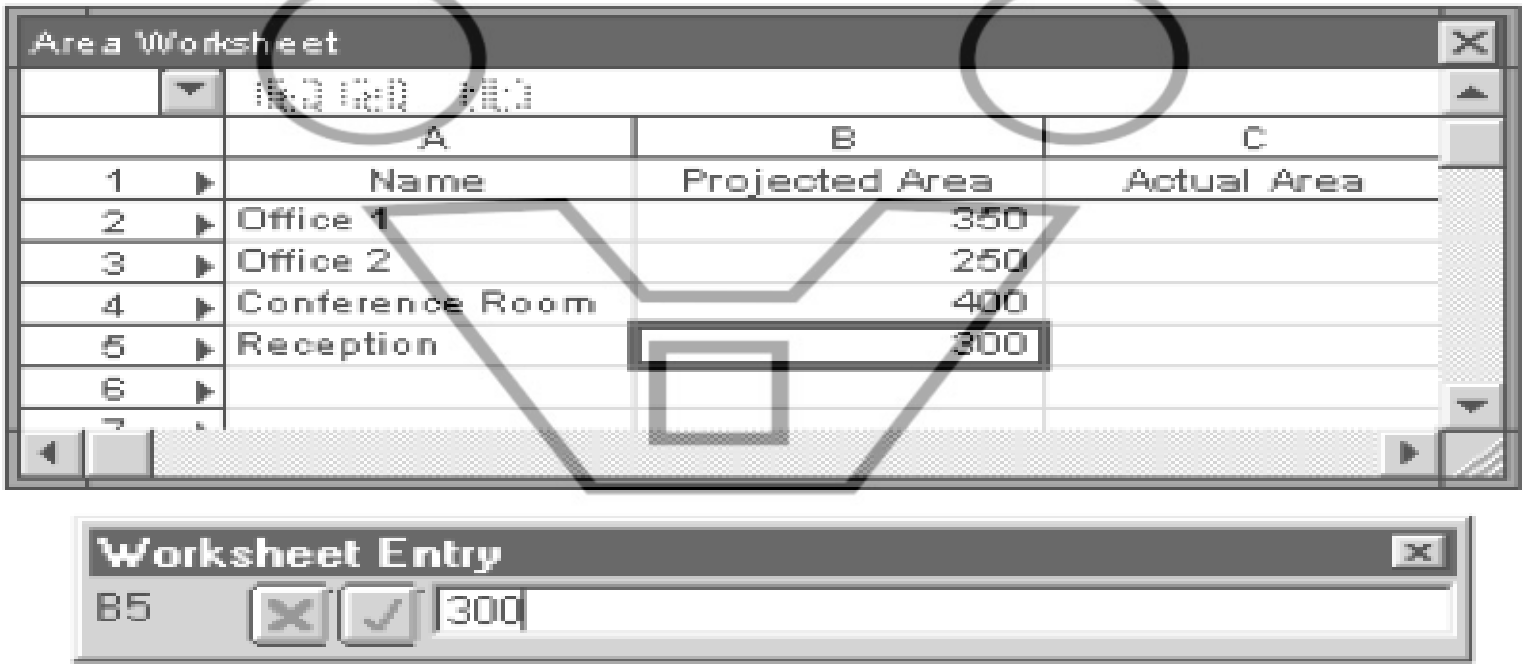
1.DIMENSIONAMENTO (programming)

2. ORGANIZZAZIONE (planning)

http://www.mailab.biz/space-planning-concept/

1.DIMENSIONAMENTO (programming)

PROGRAMMA EDILIZIO: DIMENSIONAMENTO DEGLI SPAZI



PROGRAMMA EDILIZIO: DIMENSIONAMENTO DEGLI SPAZI **SPECIFICHE DIMENSIONALI**

Decreto Ministeriale 18 dicembre 1975

STIMA ANALITICA DA STANDARD

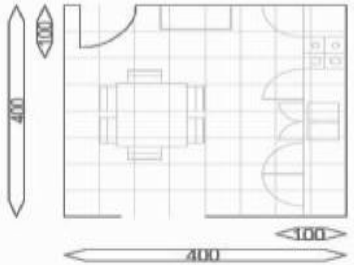
TABELLA 6 - STANDARD DI SUPERFICIE: SCUOLA ELEMENTARE

	Descrizione attività	m^2/alunno
1	*Attività didattiche:*	
	attività normali	1,80
	attività interciclo	0,64
	Indice di superficie totale riferito alle attività didattiche	
	min.	2,44
	max	2,70
2	*Attività collettive:*	
	- attività integrative e parascolastiche	0,40
	- mensa e relativi servizi (1*)	0,70
3	*Attività complementari:*	
	- biblioteca insegnanti	0,13
	Indice di superficie netta globale	5,21
	Indice di superficie max. netta globale	5,58
	Somma indici parziali	
	min.	3,67
	max	3,93
	Connettivo e servizi igienici (42% della somma precente)	
	min.	1,54
	max	1,65
4	*Spazi per l'educazione fisica:*	
	Palestra, servizi palestra, ecc. Tipo A_1: 330 m^2 (da 10 a 25 classi)	
5	*Alloggio custode* (se richiesto): 80 m^2 netti	
6	*Spazi per la direzione didattica*, (se richiesti): 100 m^2 netti	

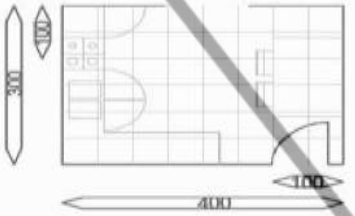
PROGRAMMA EDILIZIO: DIMENSIONAMENTO DEGLI SPAZI **SPECIFICHE DIMENSIONALI**

Unità Ambientale U.A.2	CUCINA	Note: Le U.A. dovrano essere progettate in riferimento al numero di utenza prevista per ogni alloggio.
Area Funzionale	Spazi di Servizio	
Arredi Attrezzature Apparecchiature	- blocco cucina - tavolo	- piani di appoggio - mobili con ripiani e pensili

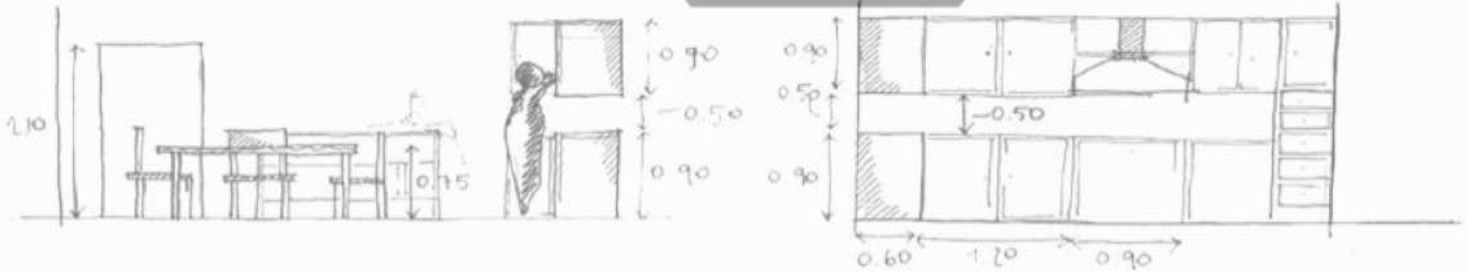
… DA ANALISI ATTIVITA'



cucina abitabile

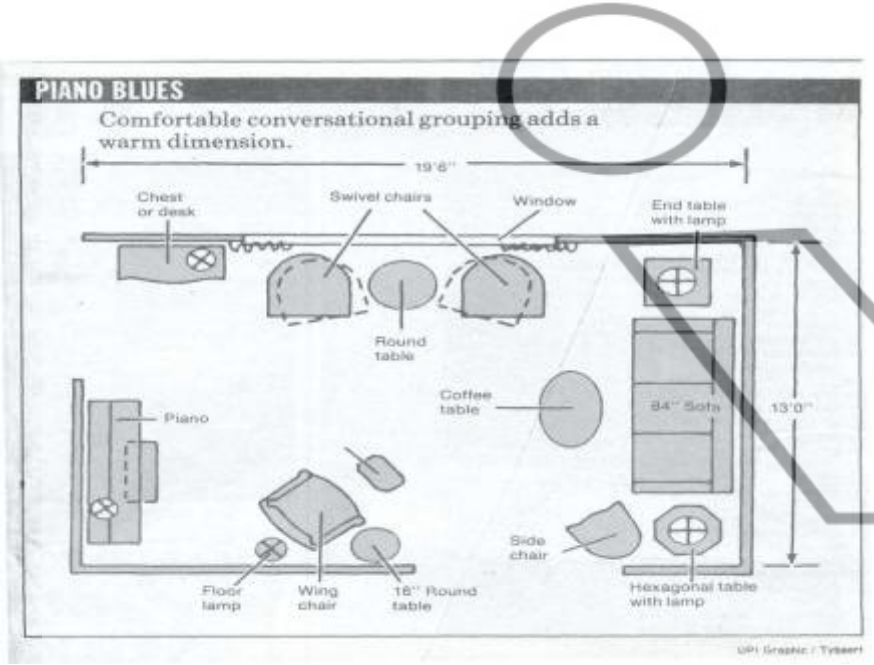


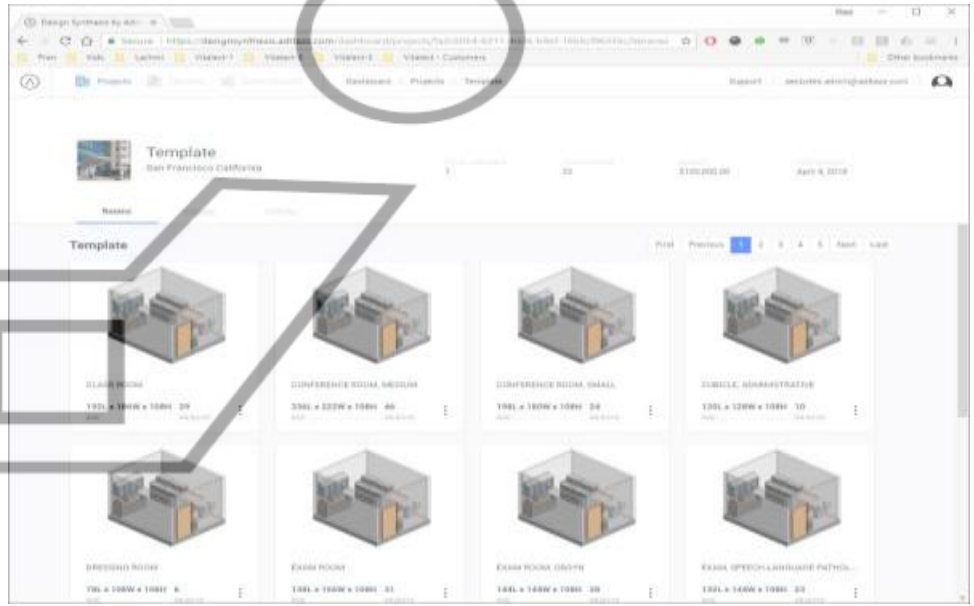
cucina in nicchia



PROGRAMMA EDILIZIO: DIMENSIONAMENTO DEGLI SPAZI **SPECIFICHE DIMENSIONALI**

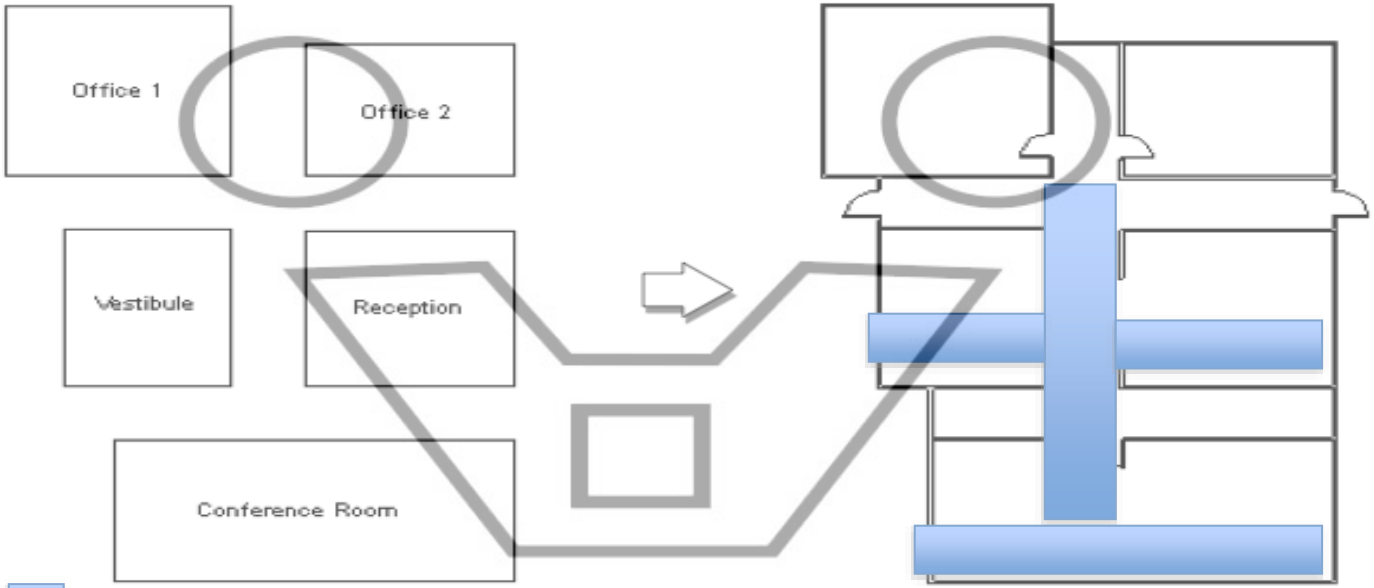
USO DI ABACHI SPAZIALI





Aditazz Design Synthesis Application

PROGRAMMA EDILIZIO: DIMENSIONAMENTO DEGLI SPAZI **SPECIFICHE DIMENSIONALI**



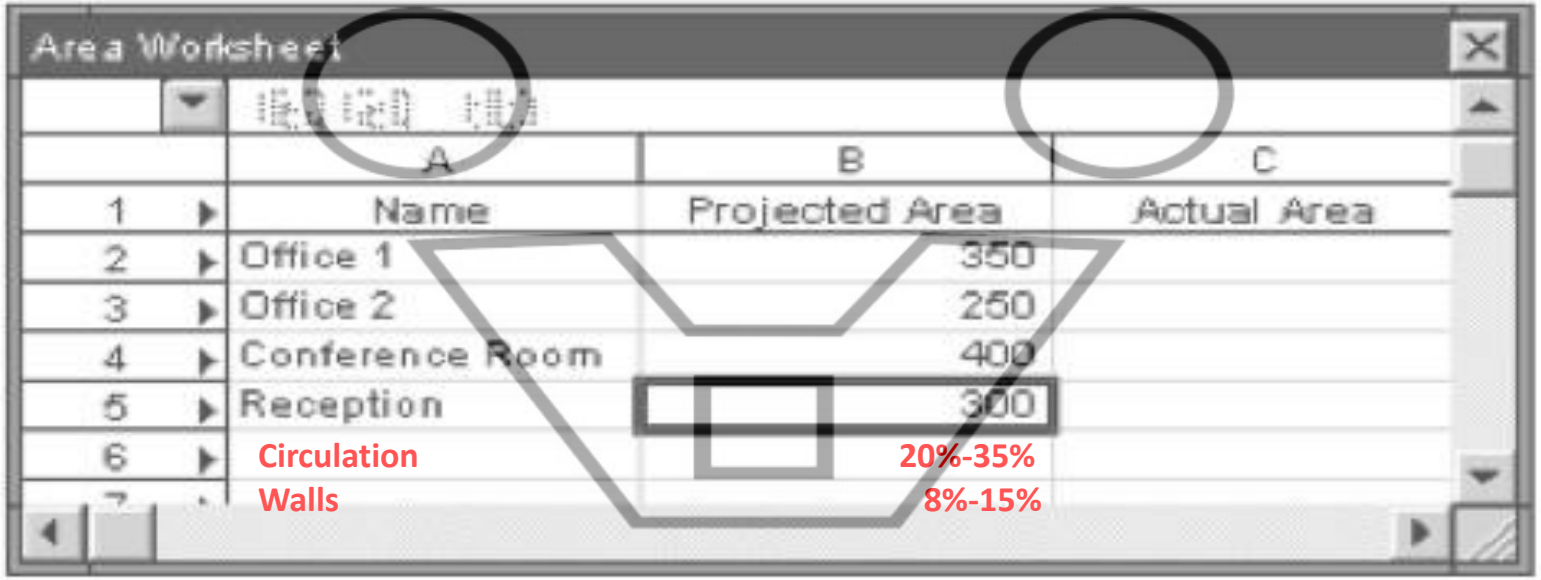
Connettivo e Circolazione 20-35%

Murature e strutture 8-15%

VEDI___http://www.aecbytes.com/review/2016/Archetris.html

PROGRAMMA EDILIZIO: DIMENSIONAMENTO DEGLI SPAZI **SPECIFICHE DIMENSIONALI**

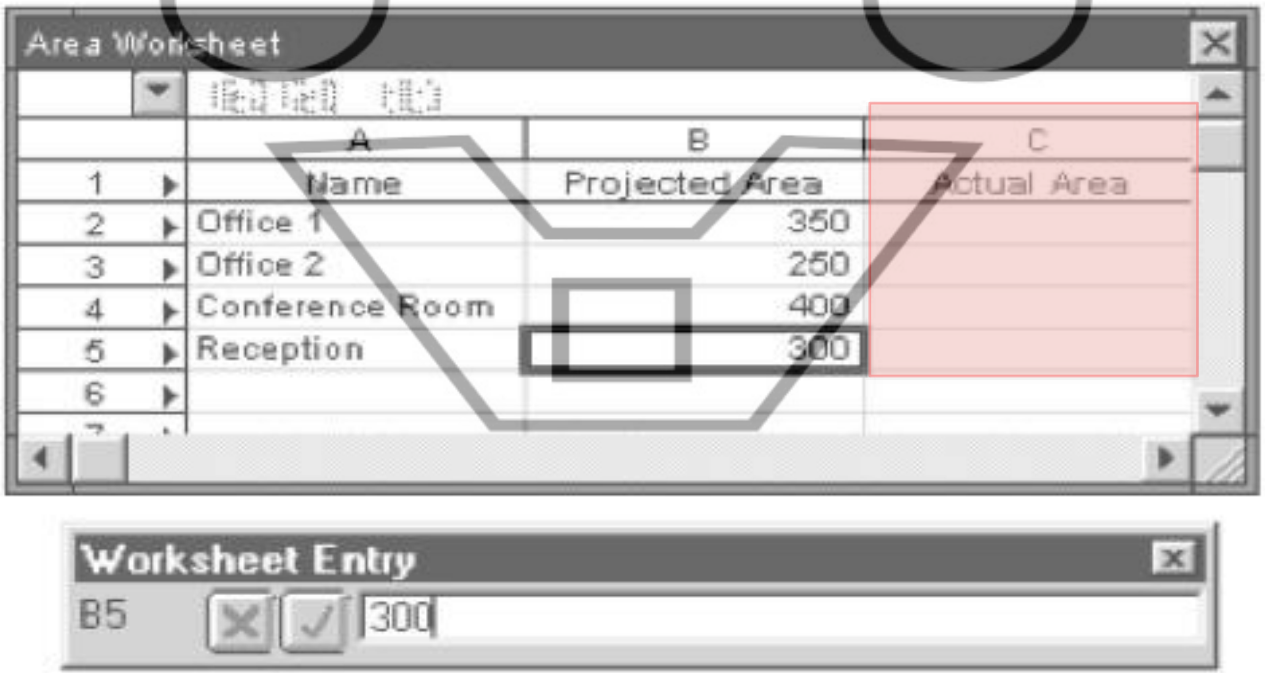
Uso di fogli elettronici



PROGRAMMA EDILIZIO: DIMENSIONAMENTO DEGLI SPAZI **SPECIFICHE DIMENSIONALI**

Uso di fogli elettronici

dynamic evaluation during the design phase



PROGRAMMA EDILIZIO: DIMENSIONAMENTO DEGLI SPAZI **SPECIFICHE DIMENSIONALI**

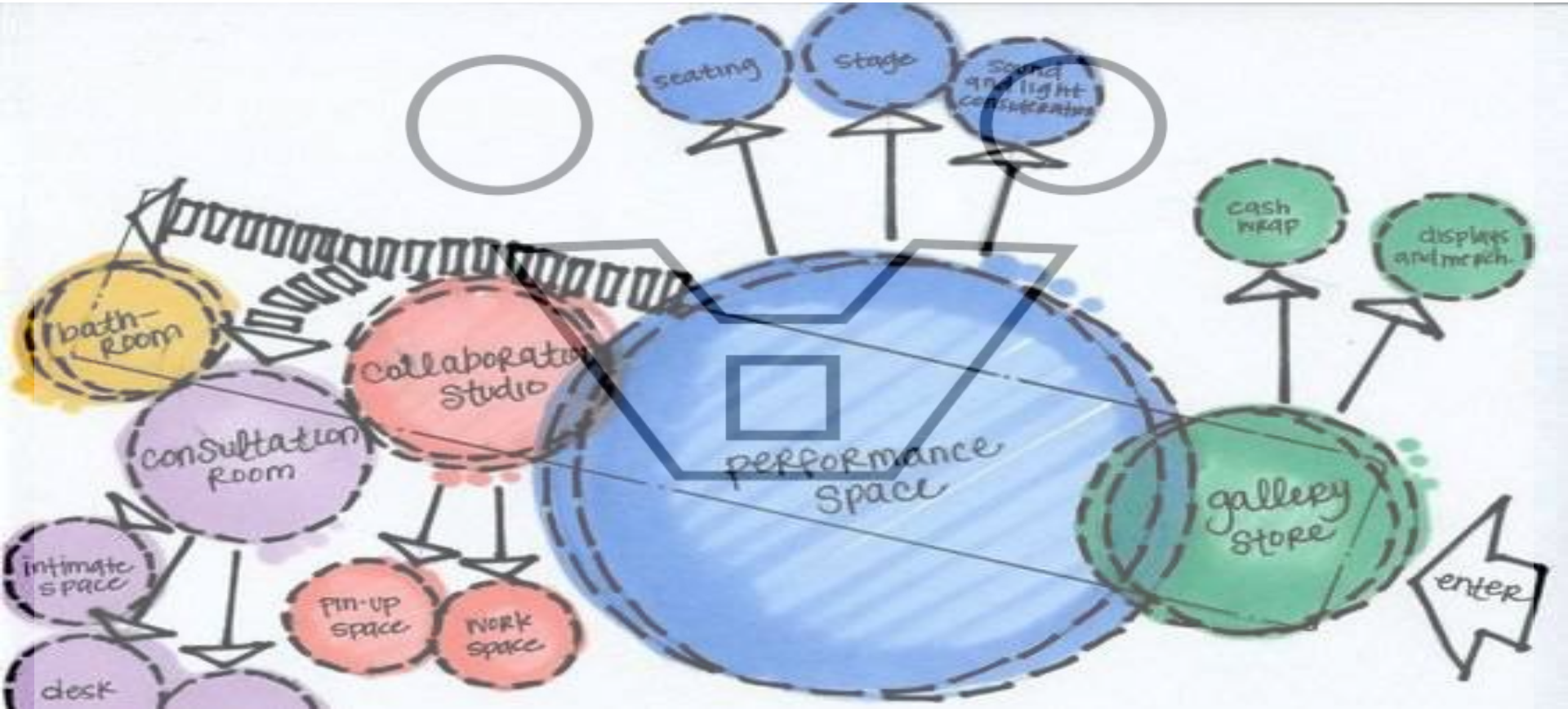
Uso di fogli elettronici

dynamic evaluation during the design phase

Area Worksheet

	A	B	C
1	Name	Projected Area	Actual Area
2	Office 1	350	350
3	Office 2	250	250
4	Conference Room	400	517.46
5	Reception	300	300
6	Vestibule		230.48
7			

2. ORGANIZZAZIONE (Planning) IL LAYOUT ARCHITETTONICO



DIAGRAMMI FUNZIONALI

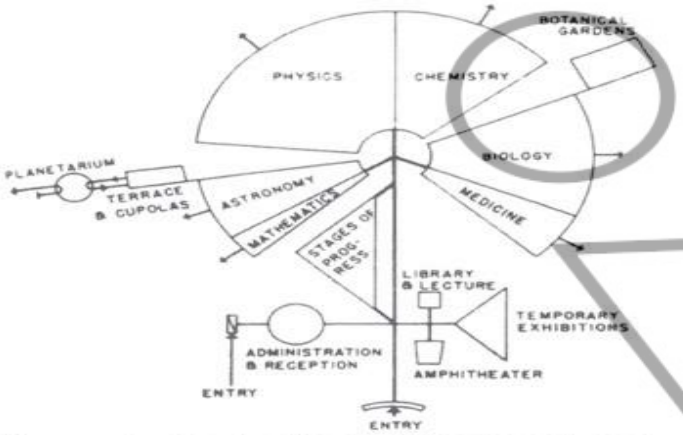
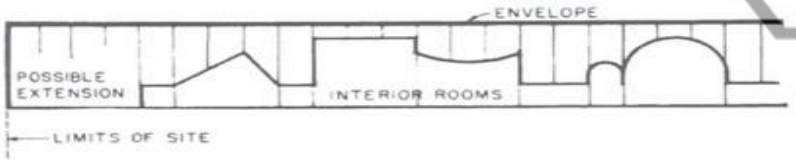
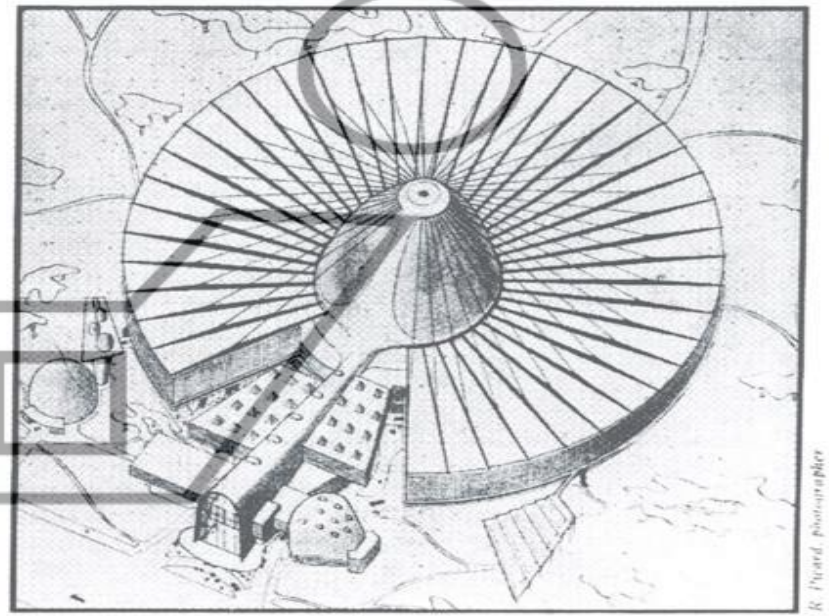


Diagram showing functional relationships of areas



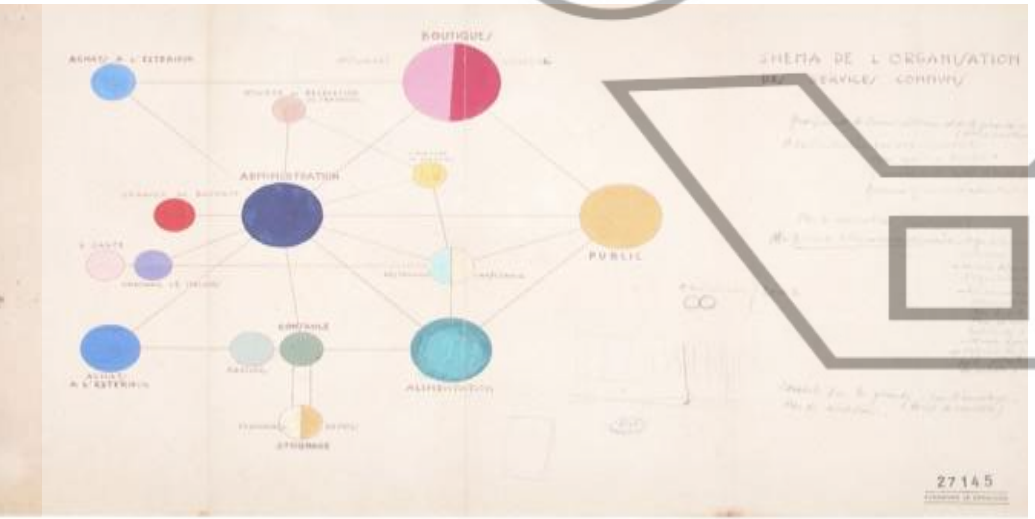
Envelope



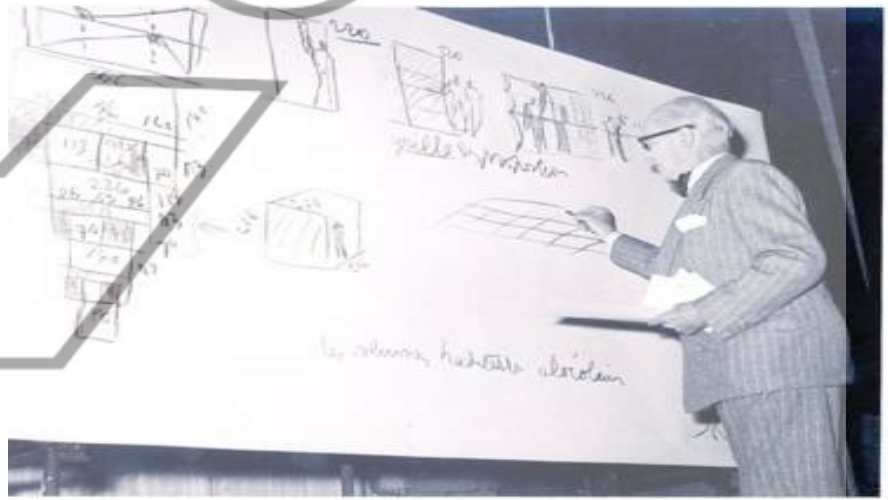
Perspective view from entrance side

Figure 8 Paul Nelson, 'Museum of Science' (or Palace of Discovery). From *Architectural Record*, February 1939. Proposed for the 1937 Exposition Internationale, Paris.

CLUSTER ANALYSIS



Le Corbusier, Marseille: Unité d'habitation, 1945. Bubble diagram of communal services for the building complex. © FLC/ADAGP, Paris and DACS, London 2008.



Le Corbusier making a presentation at the Triennale, Milan, 1951. He often lectured on architecture, using and making diagrams on the spot. © FLC/ADAGP, Paris and DACS, London 2008.

CLUSTER ANALYSIS

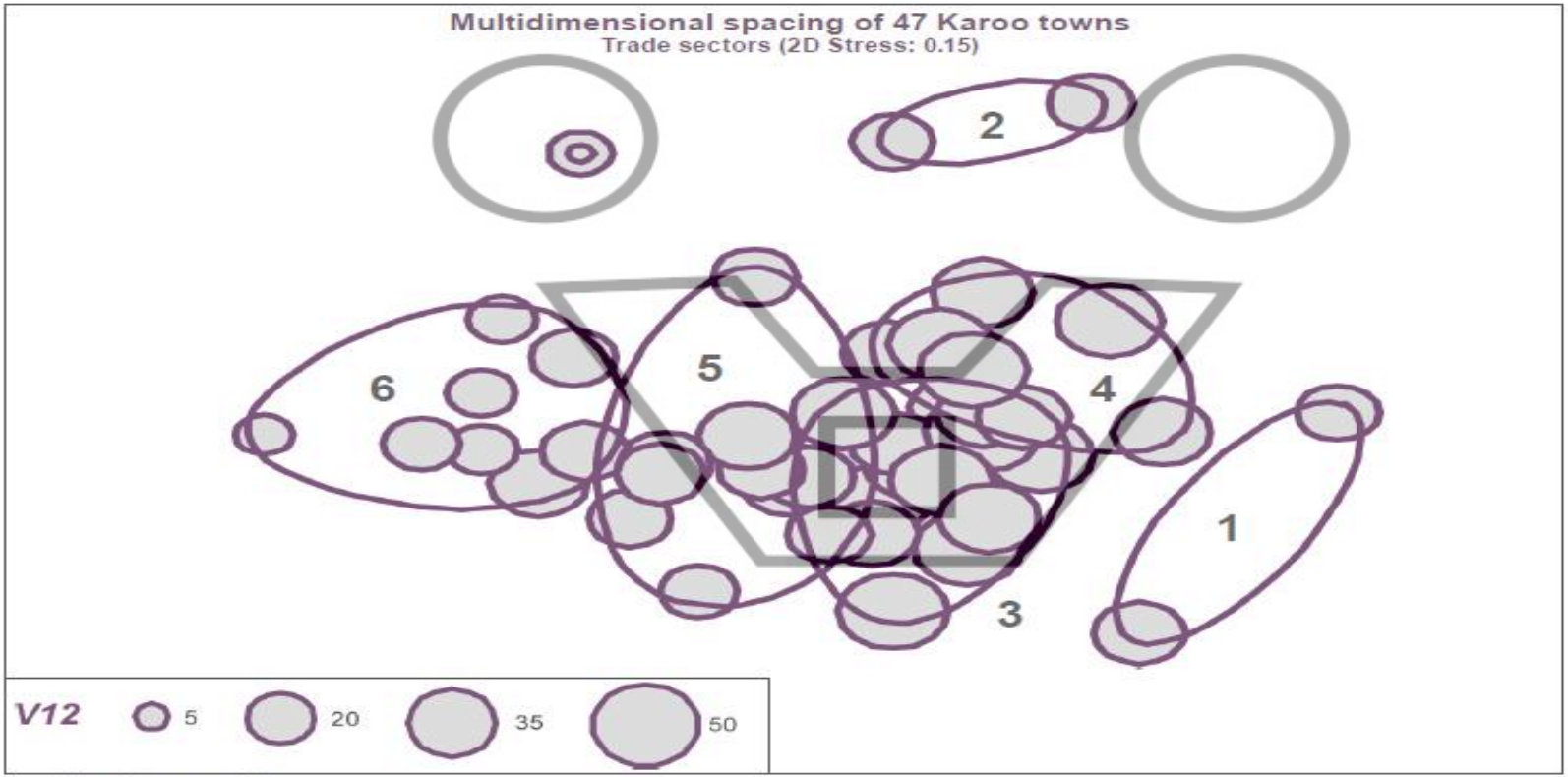
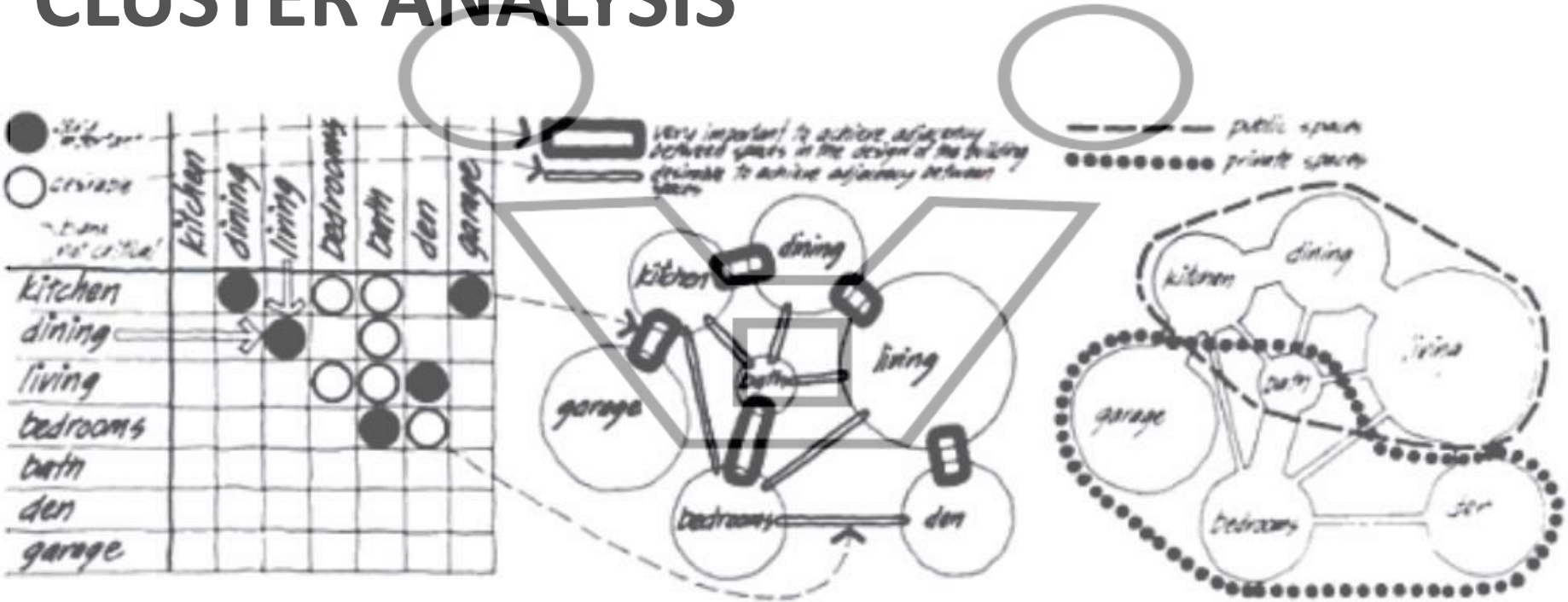
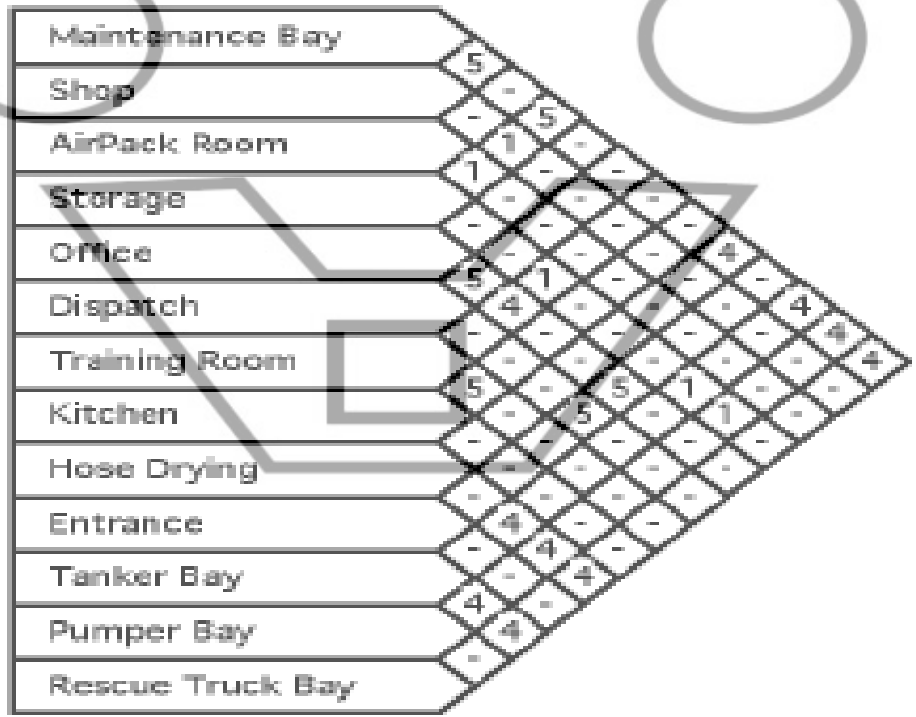


FIGURE 6
Multidimensional spacing plot of the trade sectors of the different clusters

CLUSTER ANALYSIS



MATRICE DI ADIACENZA



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http://www.mailab.biz/space-planning-concept/

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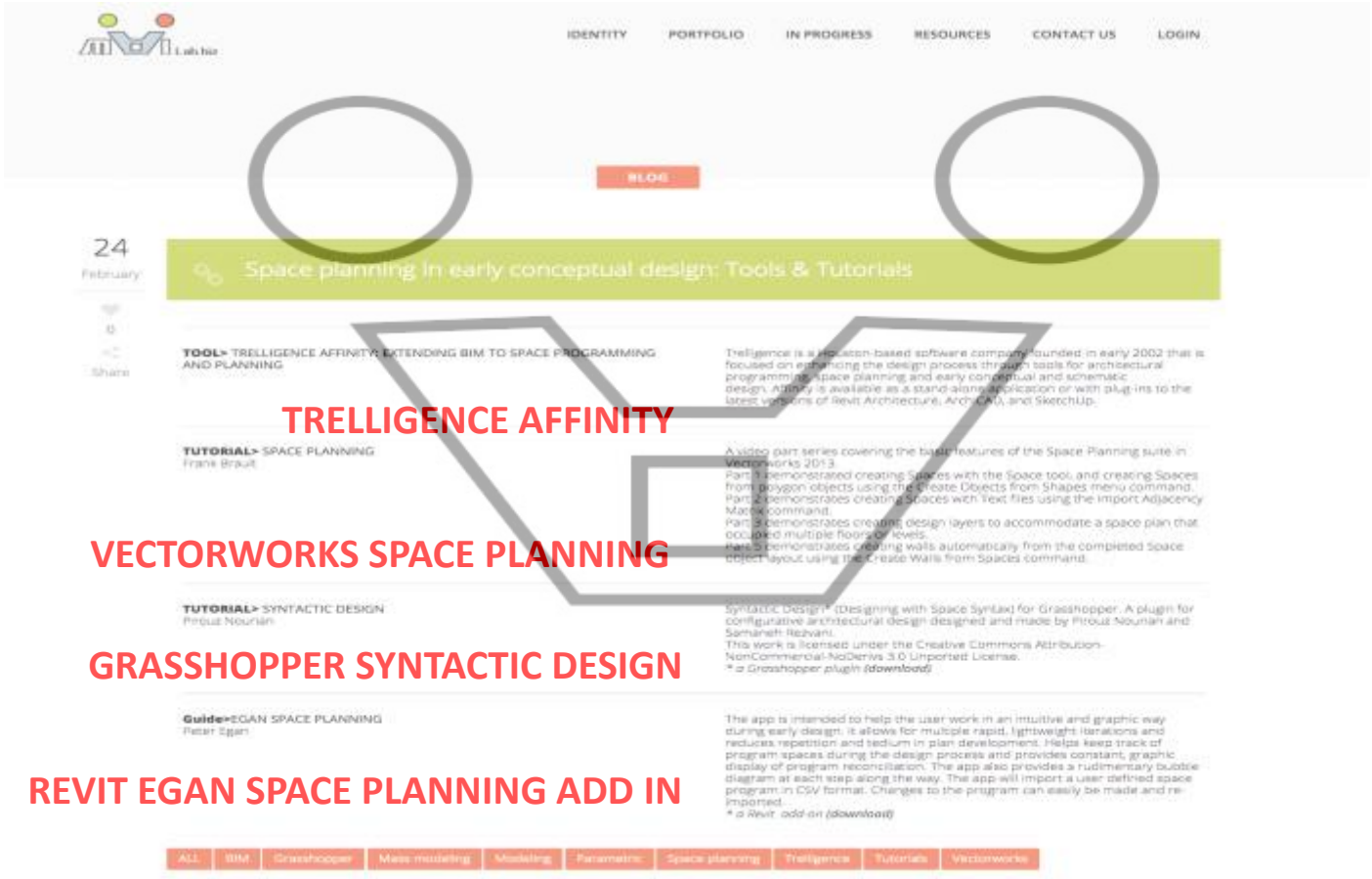
http://www.mailab.biz/space-planning-concept/



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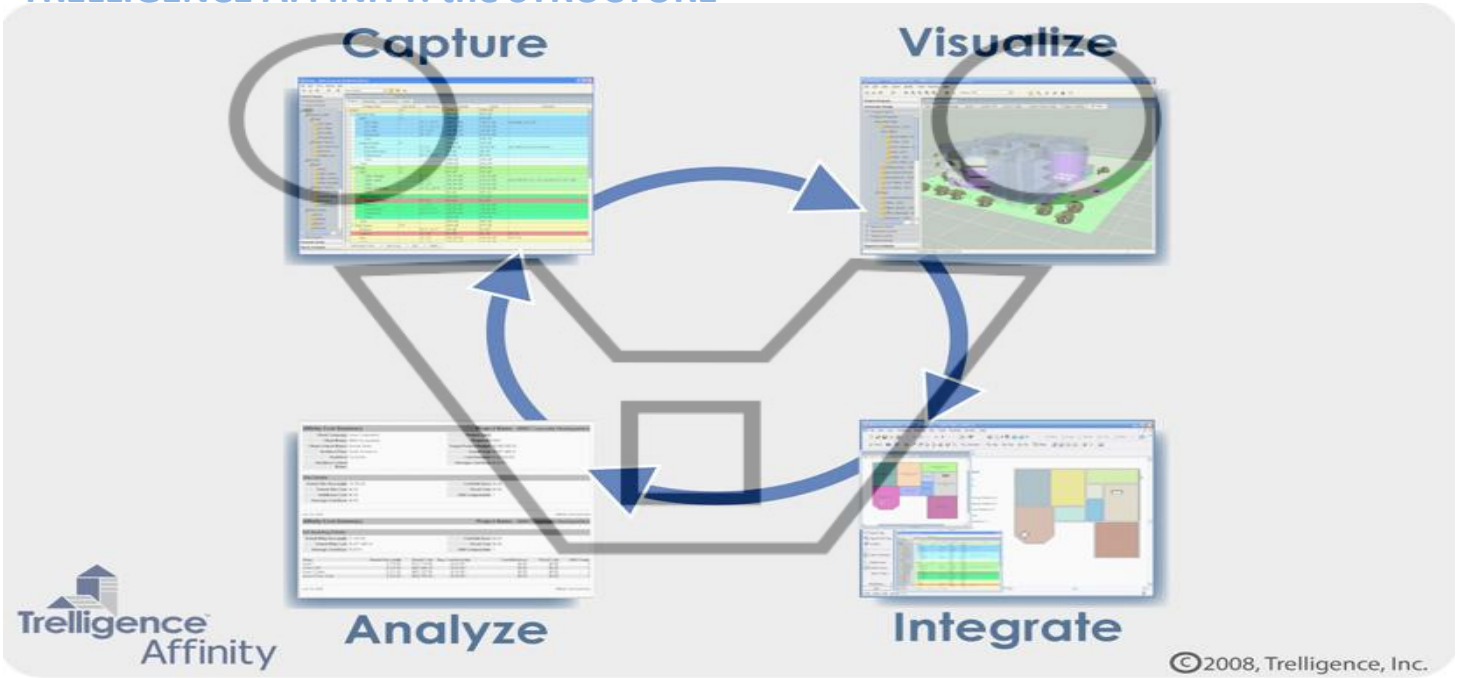
SPACE PROGRAMMING & PLANNING USANDO STRUMENTI COMPUTAZIONALI

TRELLIGENCE AFFINITY: the STRUCTURE



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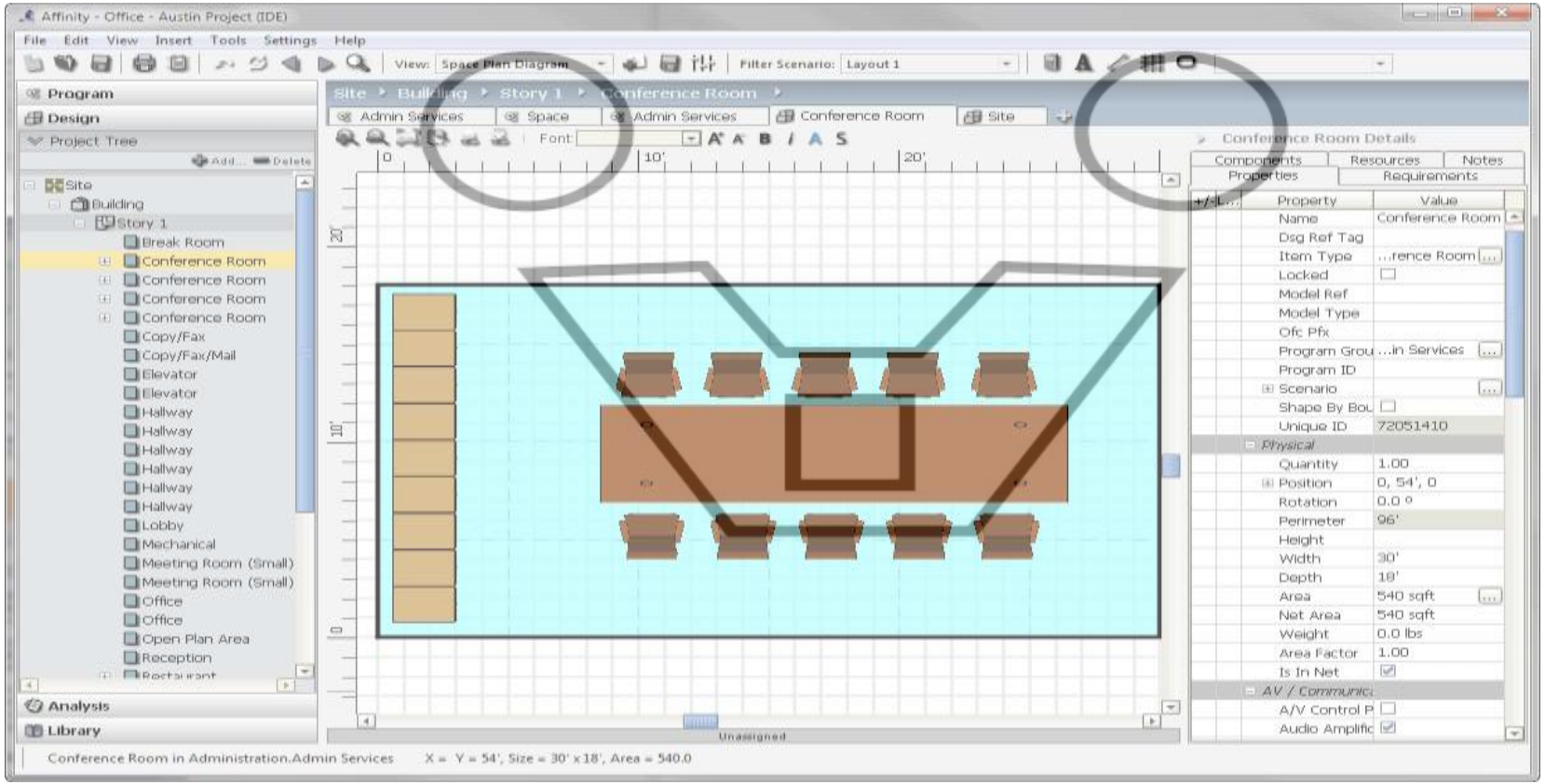
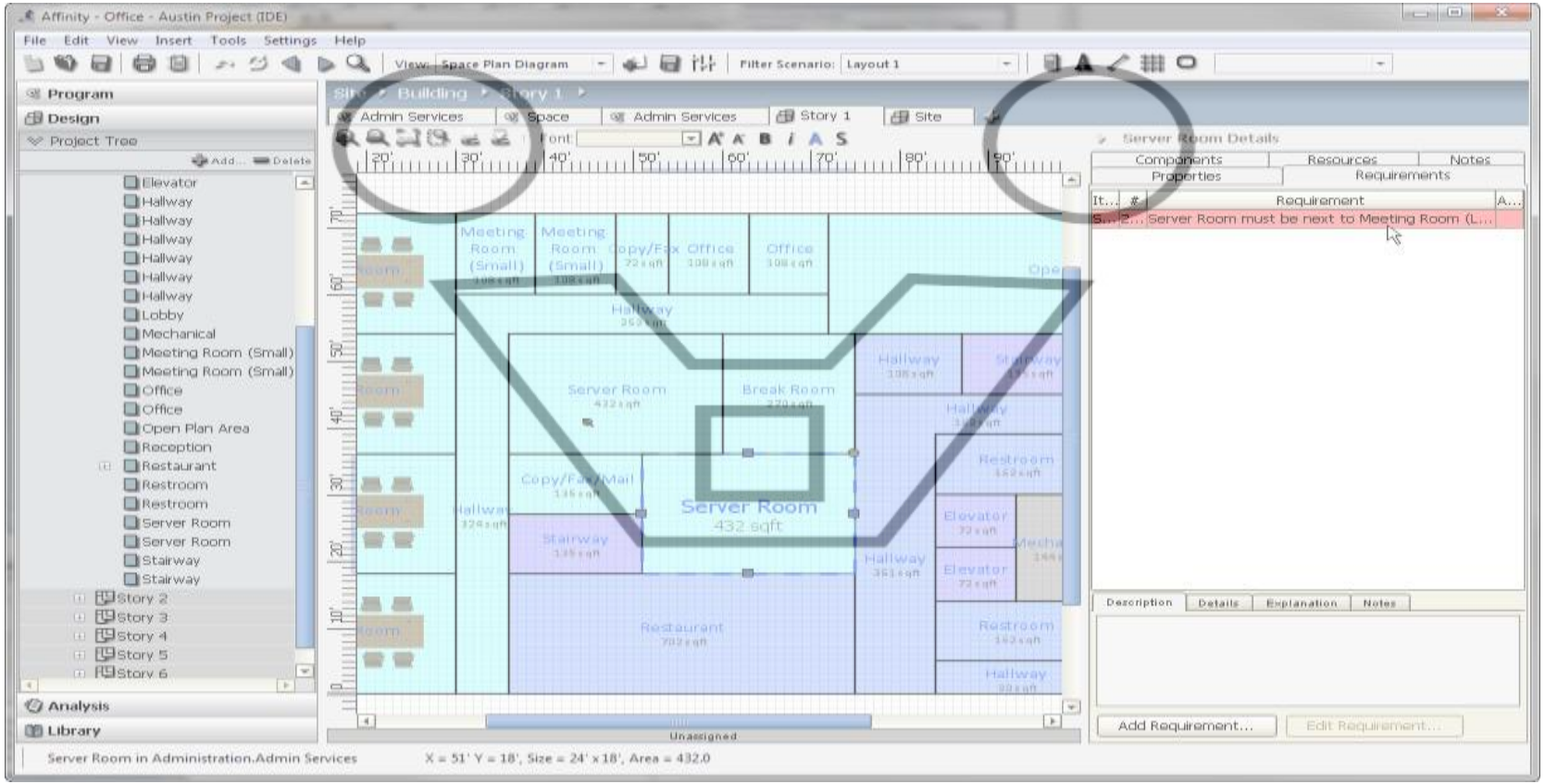
TRELLIGENCE AFFINITY: the SPACE LIBRARY



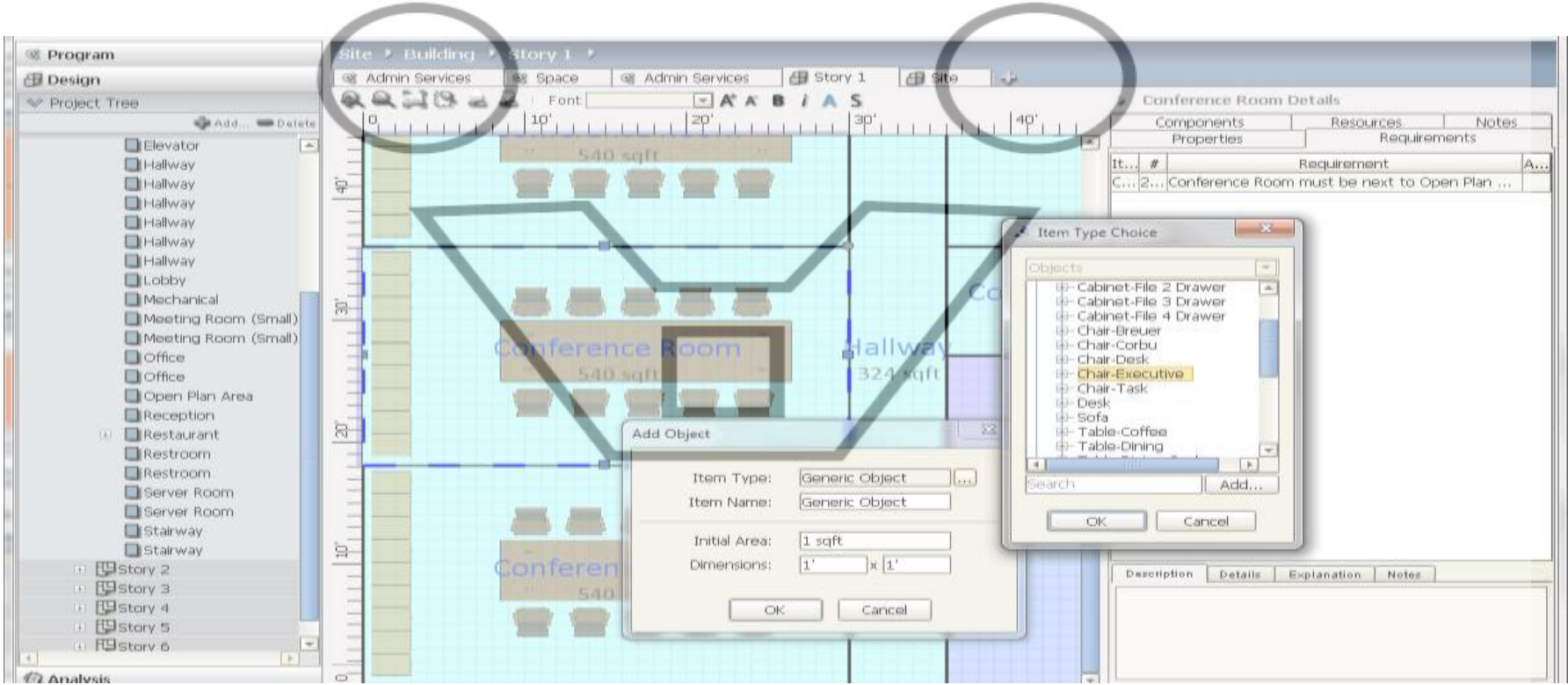
SPACE PROGRAMMING & PLANNING USANDO STRUMENTI COMPUTAZIONALI

TRELLIGENCE AFFINITY: the DESIGN MODULE



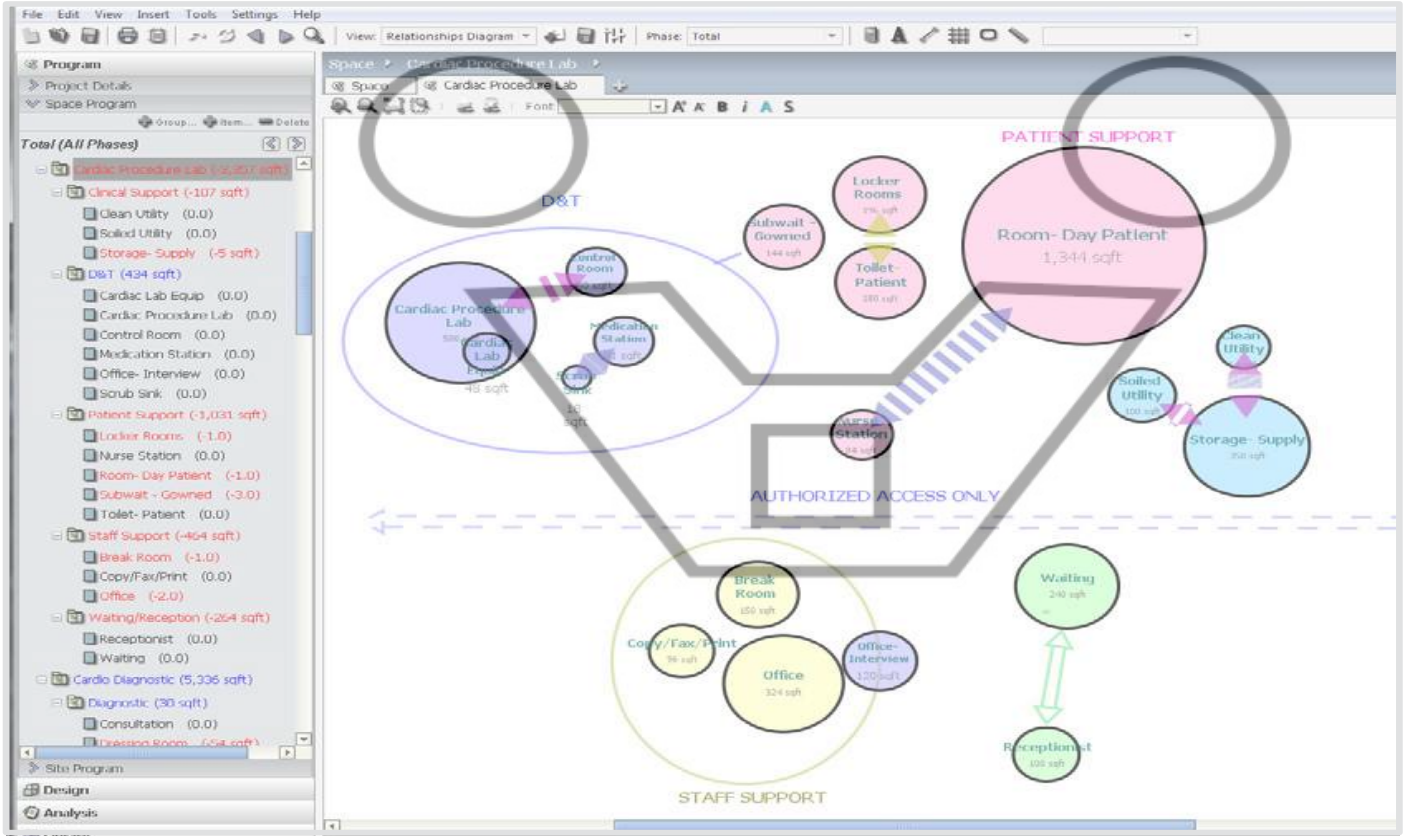
SPACE PROGRAMMING & PLANNING USANDO STRUMENTI COMPUTAZIONALI

TRELLIGENCE AFFINITY: the DESIGN MODULE



SPACE PROGRAMMING & PLANNING USANDO STRUMENTI COMPUTAZIONALI

TRELLIGENCE AFFINITY: the RELATIONSHIPS DIAGRAM



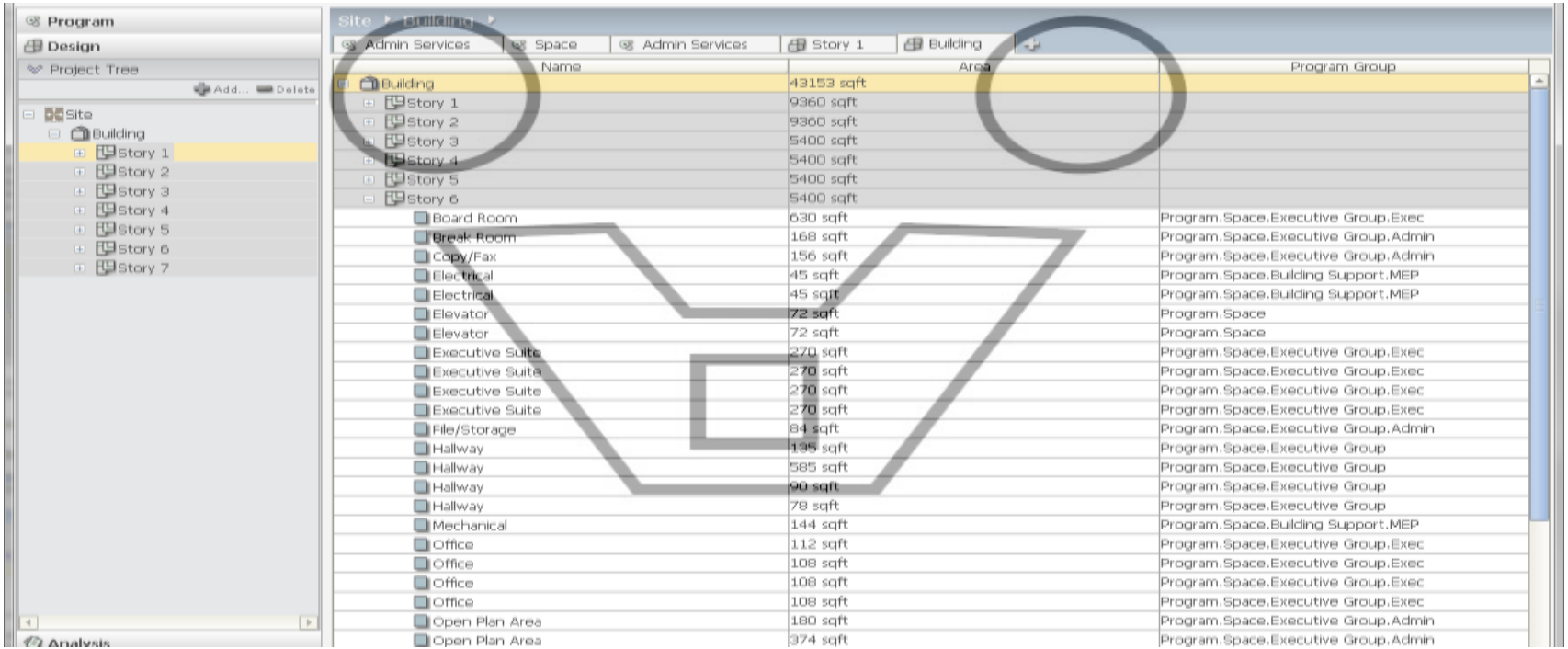
Relationships / Bubble Diagrams

Relationships diagrams are generated from the program automatically. When the program changes, so do the diagrams, to represent new quantities and relationships. Functions include:

- Use of color representing program departments / divisions
- User-customizable relationship indicators - arrows, lines, etc.
- User-customizable diagram annotations - text, circles, lines, arrows, etc.
- Ability to save different views of the same data
- Printing to scale, with customizable title blocks

SPACE PROGRAMMING & PLANNING USANDO STRUMENTI COMPUTAZIONALI

TRELLIGENCE AFFINITY: the CHECKER



Name	Area	Program Group
Building	43153 sqft	
Story 1	9360 sqft	
Story 2	9360 sqft	
Story 3	5400 sqft	
Story 4	5400 sqft	
Story 5	5400 sqft	
Story 6	5400 sqft	
Board Room	630 sqft	Program.Space.Executive Group.Exec
Break Room	168 sqft	Program.Space.Executive Group.Admin
Copy/Fax	156 sqft	Program.Space.Executive Group.Admin
Electrical	45 sqft	Program.Space.Building Support.MEP
Electrical	45 sqft	Program.Space.Building Support.MEP
Elevator	72 sqft	Program.Space
Elevator	72 sqft	Program.Space
Executive Suite	270 sqft	Program.Space.Executive Group.Exec
Executive Suite	270 sqft	Program.Space.Executive Group.Exec
Executive Suite	270 sqft	Program.Space.Executive Group.Exec
Executive Suite	270 sqft	Program.Space.Executive Group.Exec
File/Storage	84 sqft	Program.Space.Executive Group.Admin
Hallway	135 sqft	Program.Space.Executive Group
Hallway	585 sqft	Program.Space.Executive Group
Hallway	90 sqft	Program.Space.Executive Group
Hallway	78 sqft	Program.Space.Executive Group
Mechanical	144 sqft	Program.Space.Building Support.MEP
Office	112 sqft	Program.Space.Executive Group.Exec
Office	108 sqft	Program.Space.Executive Group.Exec
Office	108 sqft	Program.Space.Executive Group.Exec
Office	108 sqft	Program.Space.Executive Group.Exec
Open Plan Area	180 sqft	Program.Space.Executive Group.Admin
Open Plan Area	374 sqft	Program.Space.Executive Group.Admin

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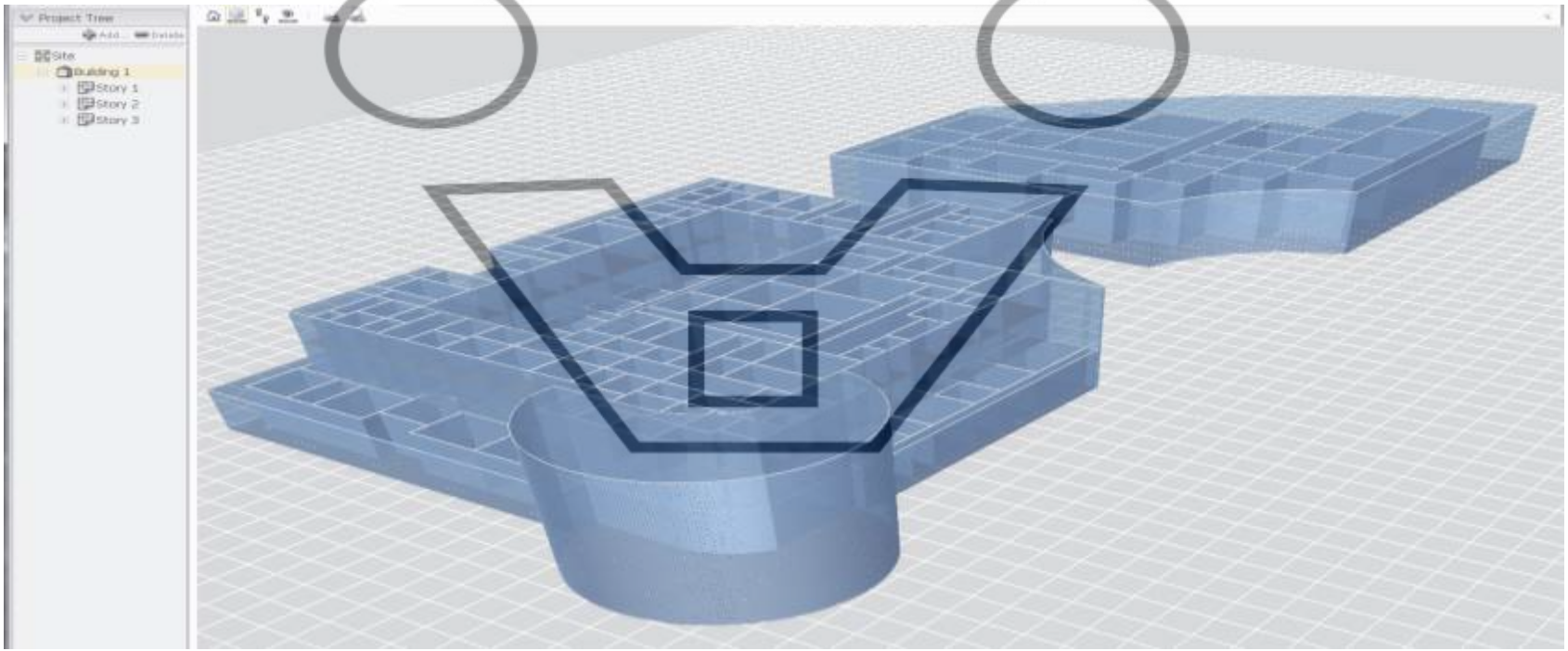
TRELLIGENCE AFFINITY: the 3d VISUALIZATION



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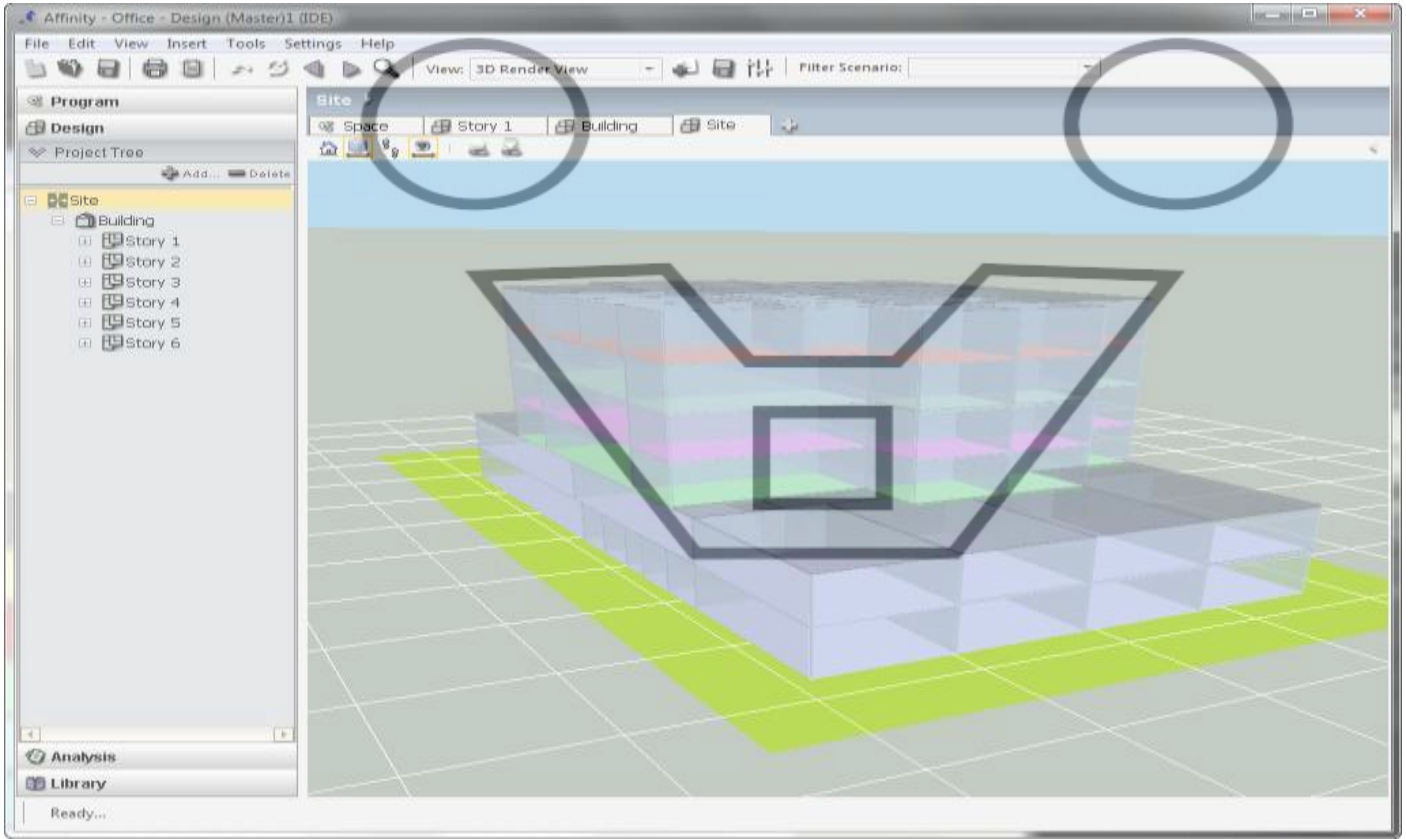
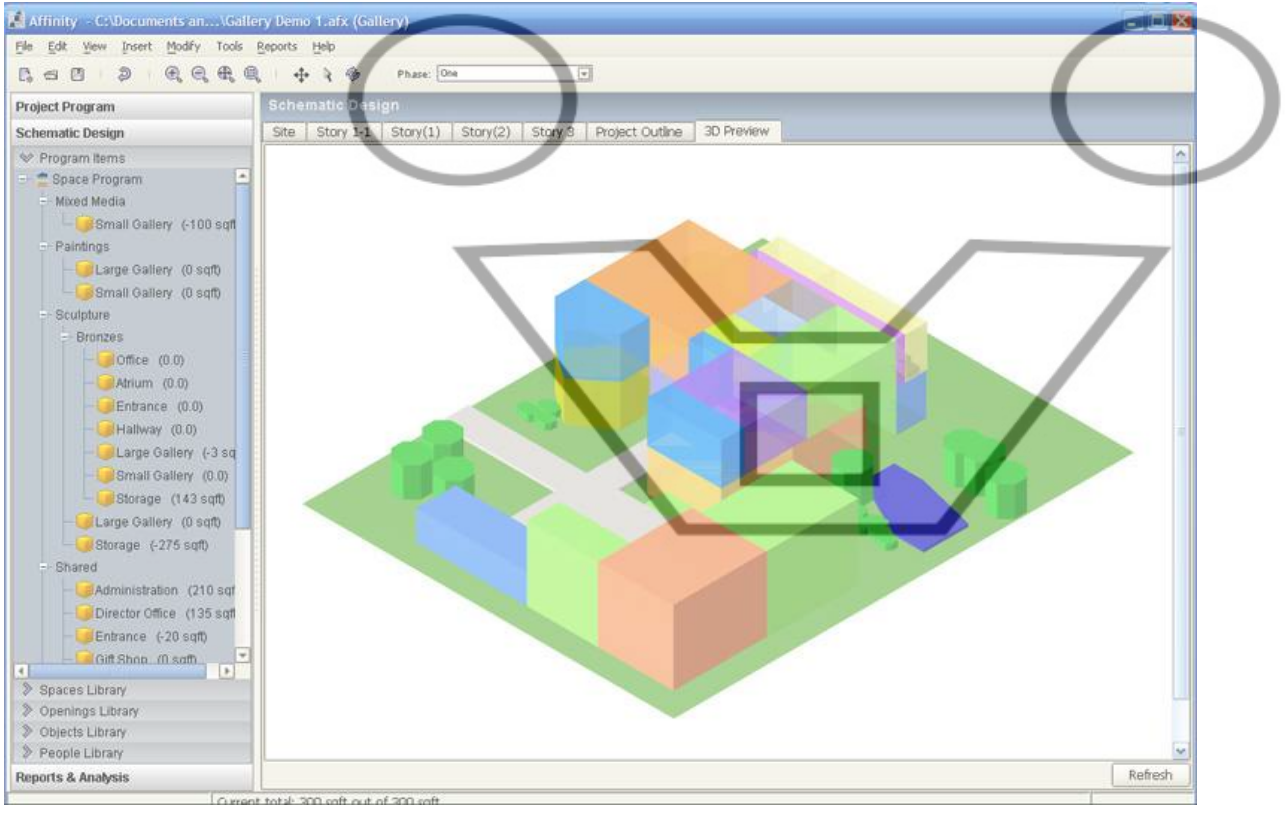
TRELLIGENCE AFFINITY: the 3d VISUALIZATION



SPACE PROGRAMMING & PLANNING USANDO STRUMENTI COMPUTAZIONALI

TRELLIGENCE AFFINITY: the SCHEMATIC DESIGN



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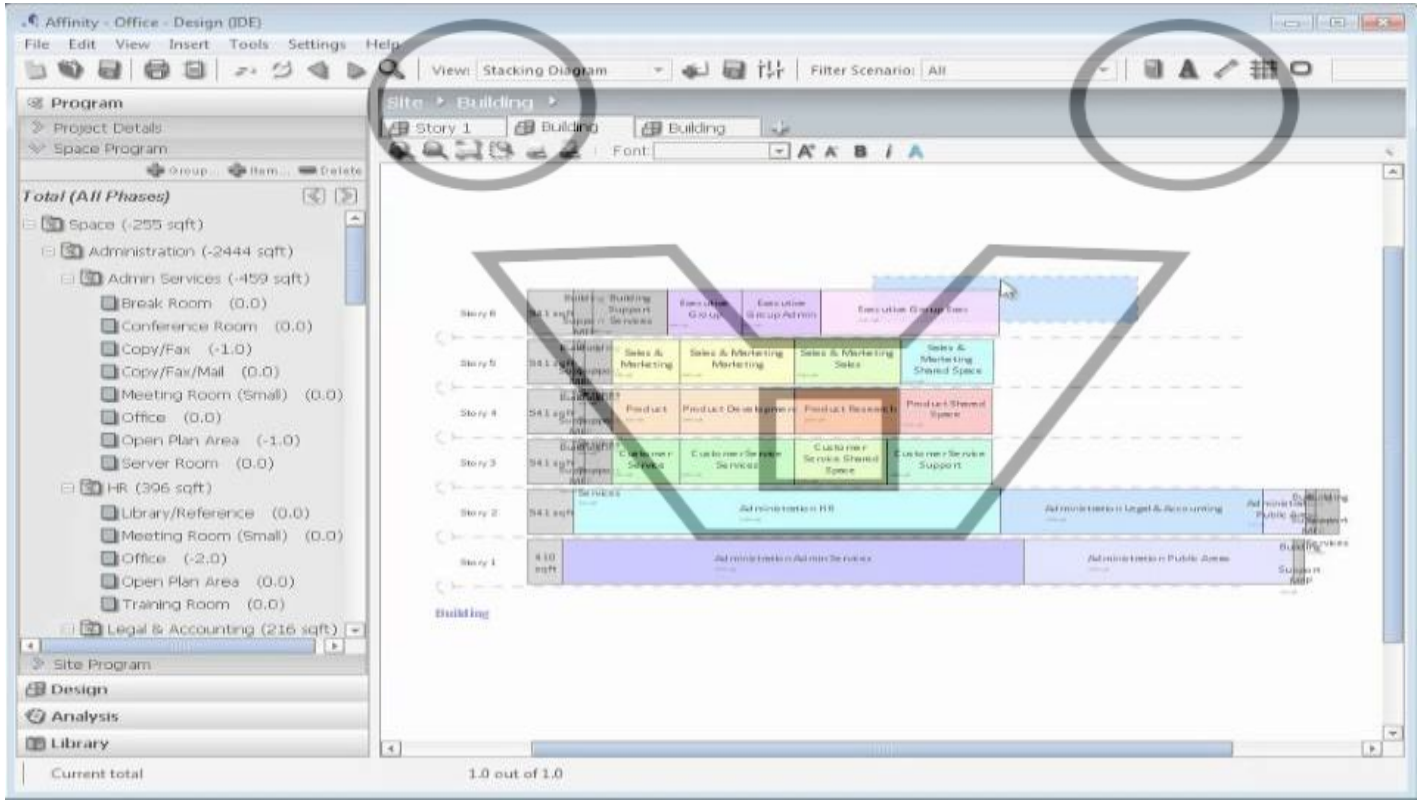
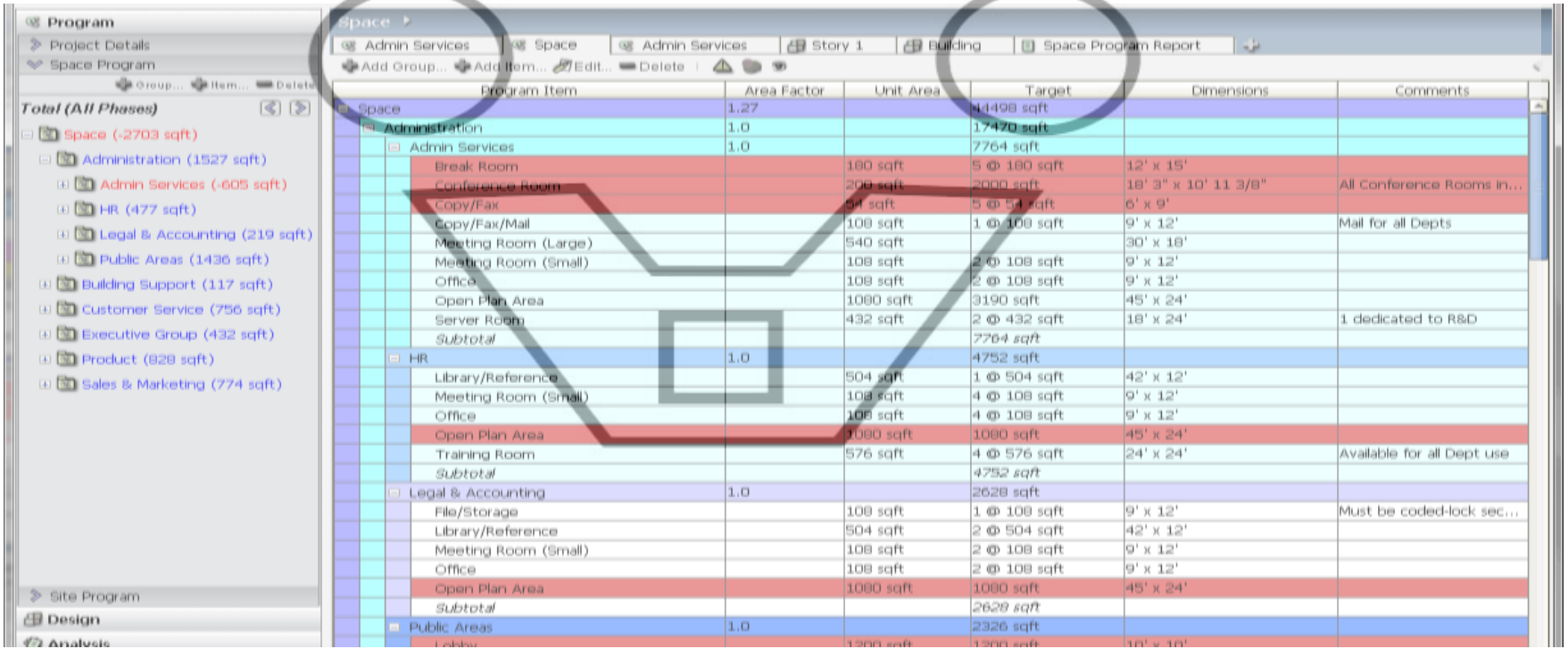
TRELLIGENCE AFFINITY: the STACK VISUALIZATION



SPACE PROGRAMMING & PLANNING USANDO STRUMENTI COMPUTAZIONALI

TRELLIGENCE AFFINITY: the SPACE QUANTITY CONTROL



SPACE PROGRAMMING & PLANNING USANDO STRUMENTI COMPUTAZIONALI

TRELLIGENCE AFFINITY: PROGRAM PHASE MANAGEMENT

Program Item	Area Factor	Phase I Qty	Phase I Area	Phase II Qty	Phase II Ar...	Total Qty	Total Area	Space Type
Space	1.0	33	30,948 sqft	17	8,674 sqft	50	39,621 sqft	
Gallery	1.2	33	21,148 sqft	17	8,674 sqft	50	29,821 sqft	
Administration	1.31	7	838 sqft	3	409 sqft	10	1,247 sqft	
Hallway								*Hallway*
File/Copy Area		1	96 sqft	1	96 sqft	2	192 sqft	Closet
File/Copy Ar								*Closet*
Meeting Room		1	92 sqft			1	92 sqft	Meeting Room
Meeting Roo								*Meeting Room*
Mgr Office		3	324 sqft	2	216 sqft	5	540 sqft	Office
Mgr Office								*Office*
Mgr Office								*Office*
Mgr Office								*Office*
Mgr Office								*Office*
Mgr Office								*Office*
Workstation		2	128 sqft			2	128 sqft	Workstation
Workstation								*Workstation*
Workstation								*Workstation*
Subtotal		*7*	*640 sqft*	*3*	*312 sqft*	*10*	*952 sqft*	
Building Support	1.15	7	2,369 sqft			7	2,369 sqft	
Hallway								*Hallway*
Building Service			1,200 sqft				1,200 sqft	Building Services
Building Ser								*Building Services*
Service Access		2	500 sqft			2	500 sqft	Building Services
Service Acc								*Hallway*
Service Acc								*Hallway*
Service Elevator		1	100 sqft			1	100 sqft	Elevator
Service Elev								*Elevator*

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TRELLIGENCE AFFINITY: INTEGRATION with REVIT

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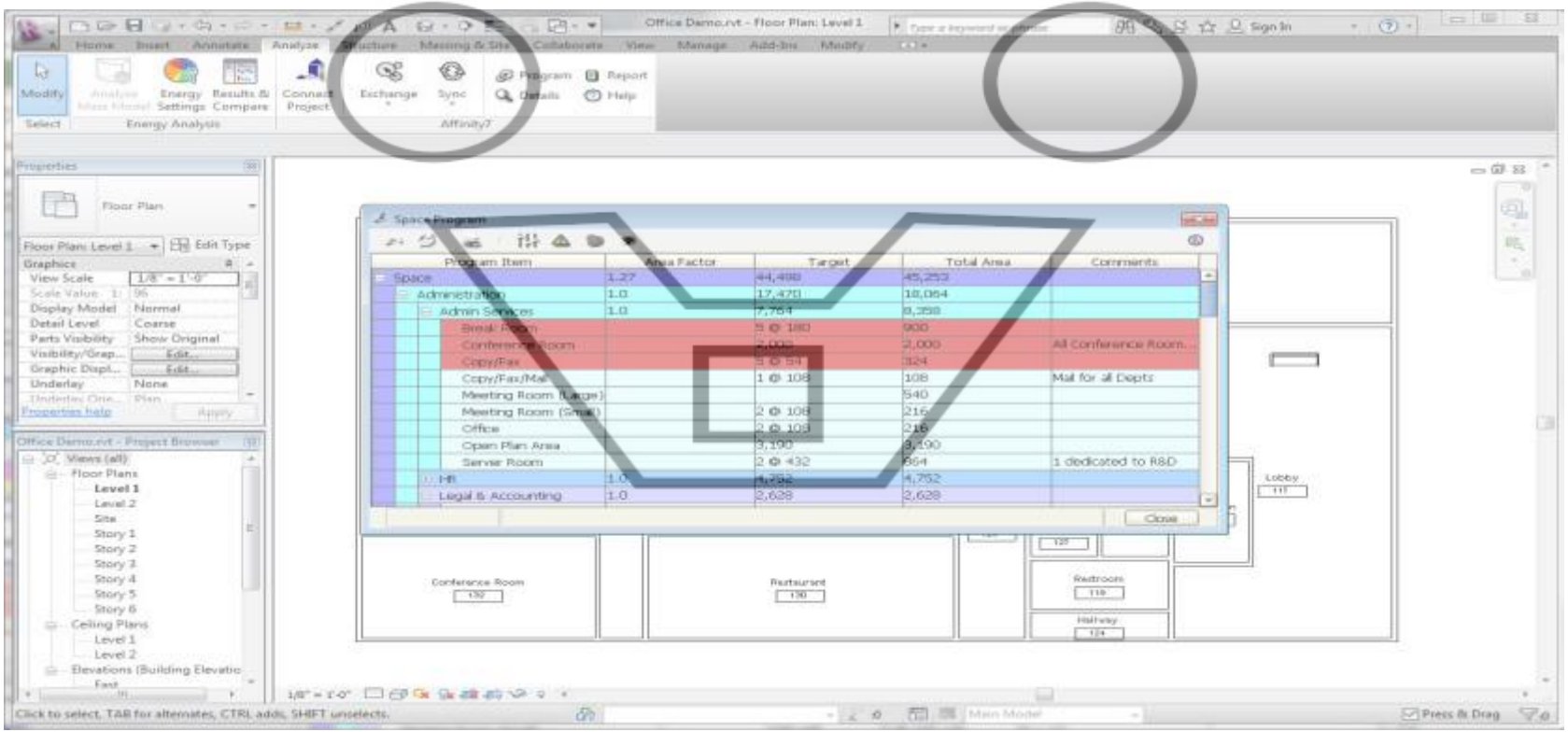
TRELLIGENCE AFFINITY: INTEGRATION with REVIT



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TRELLIGENCE AFFINITY: DESIGN TOOLS

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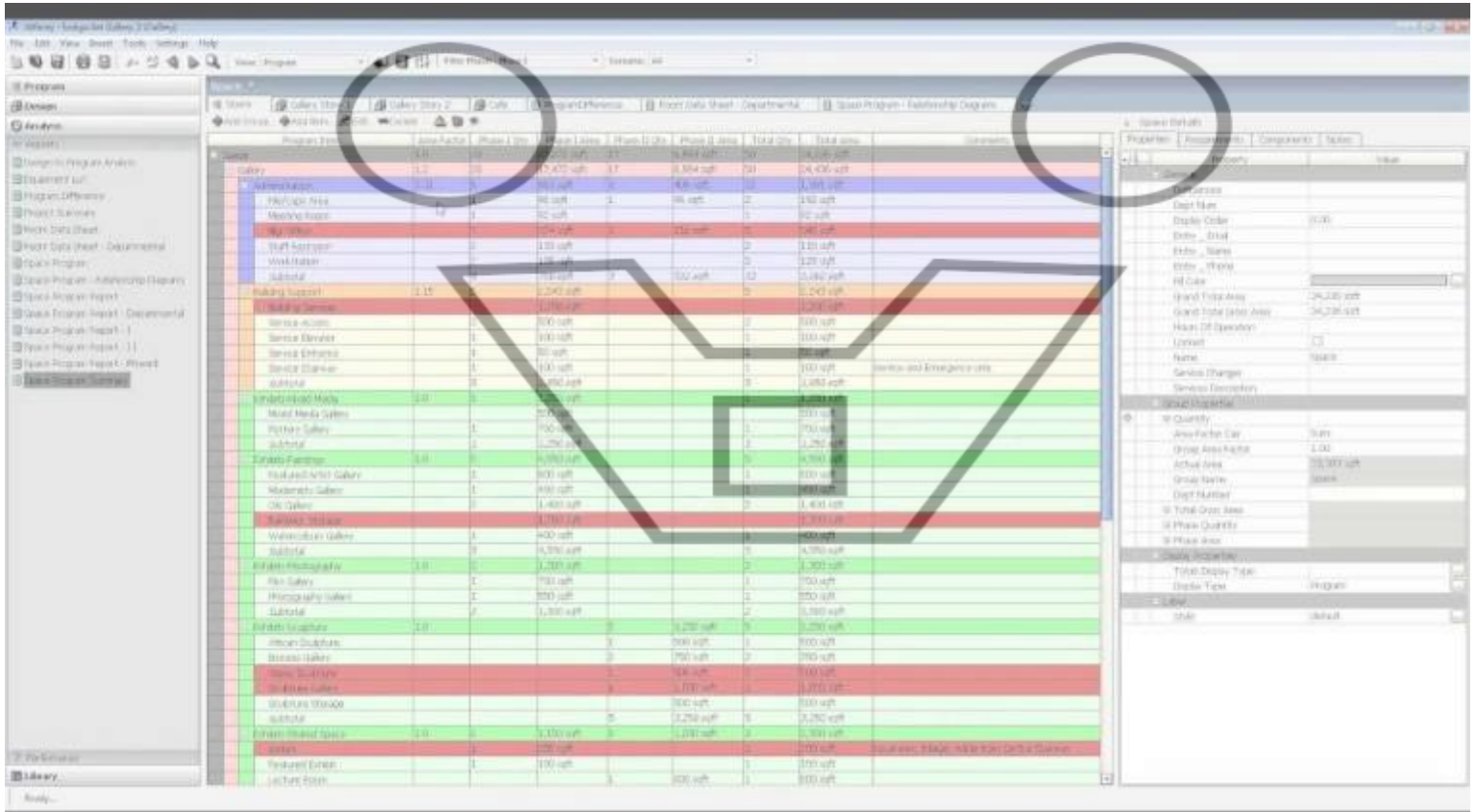
TRELLIGENCE AFFINITY: SPACE PROGRAM DYNAMIC MANAGEMENT



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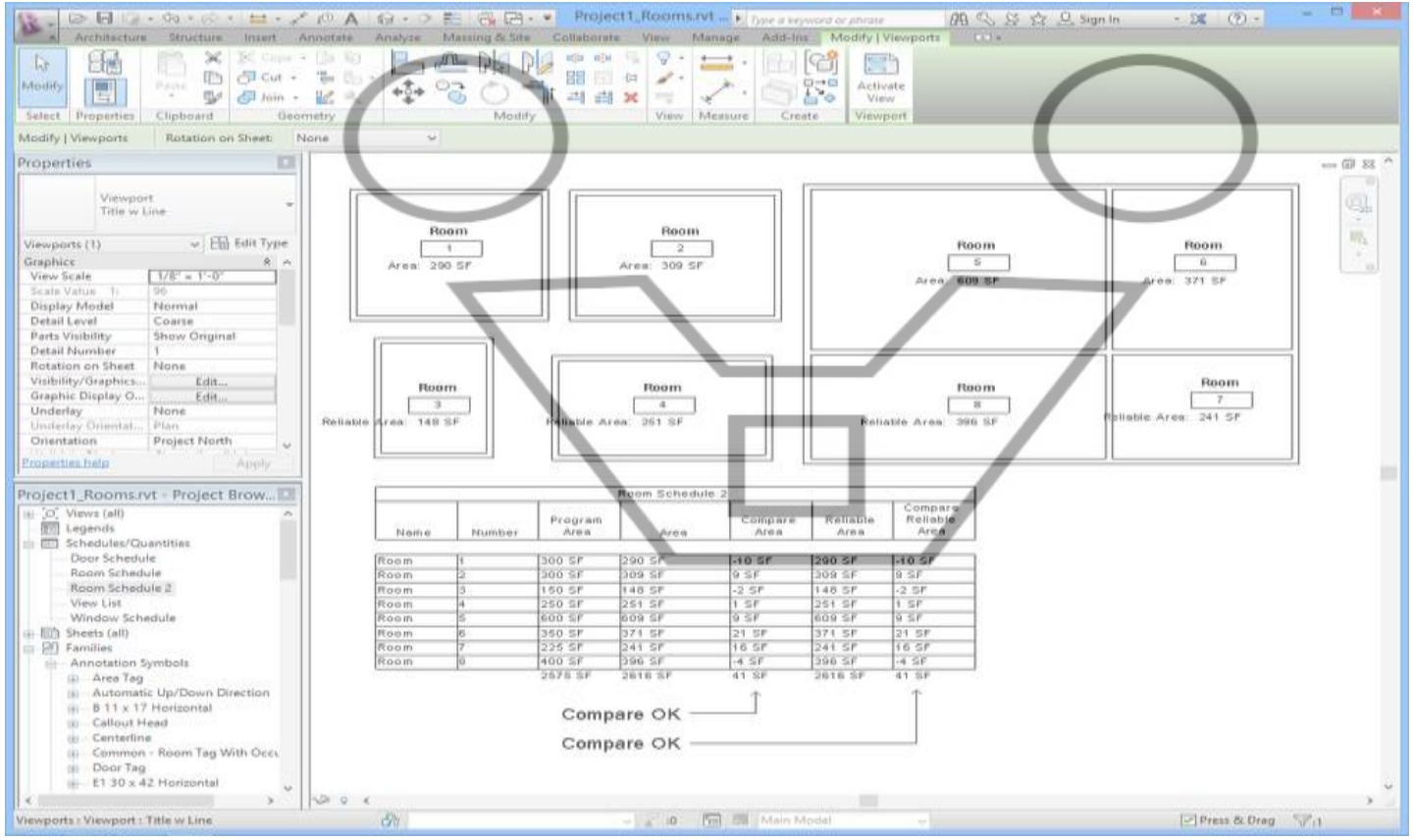
SPACE PROGRAMMING & PLANNING USANDO STRUMENTI COMPUTAZIONALI

EGAN BIM RESOURCES: ROOM AREA TOOLS



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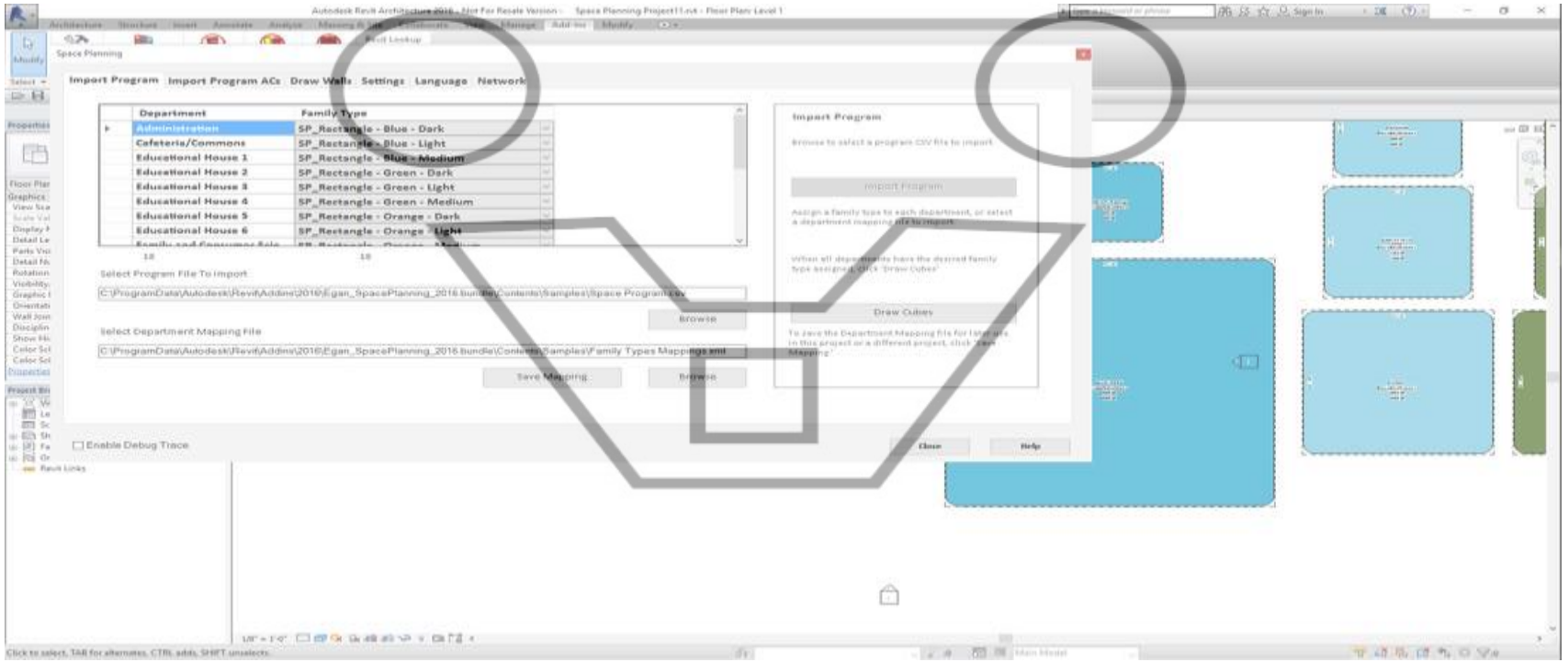
EGAN BIM RESOURCES: SHAPE GENERATOR



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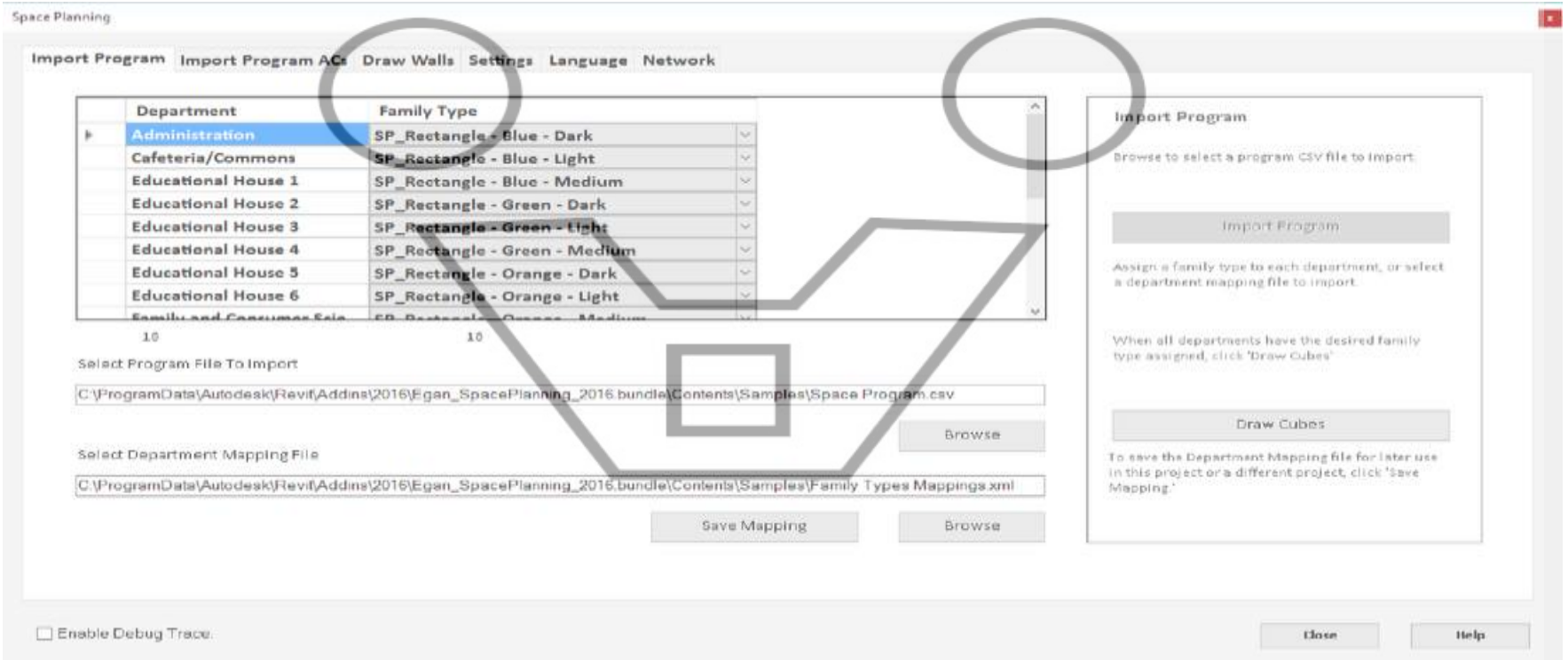
EGAN BIM RESOURCES: SHAPE GENERATOR



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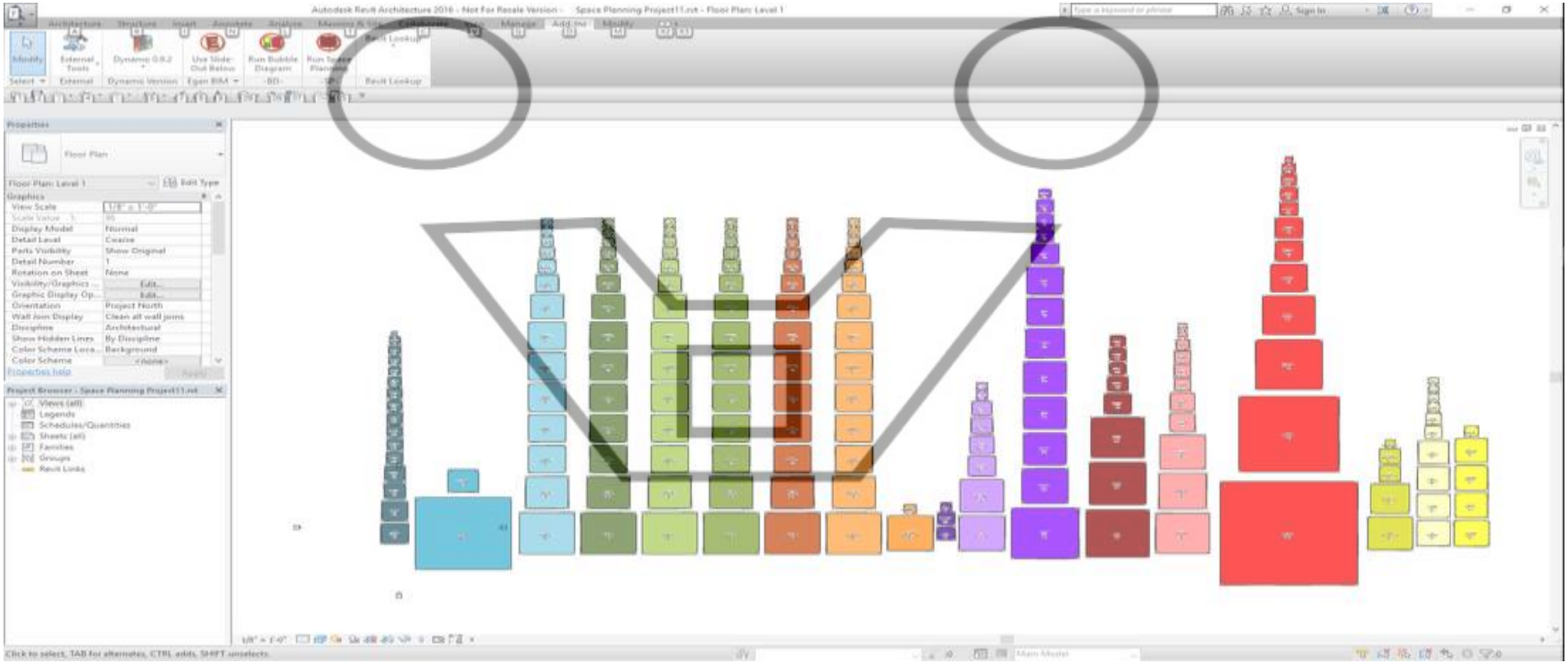
EGAN BIM RESOURCES: STACK VISUALIZATION



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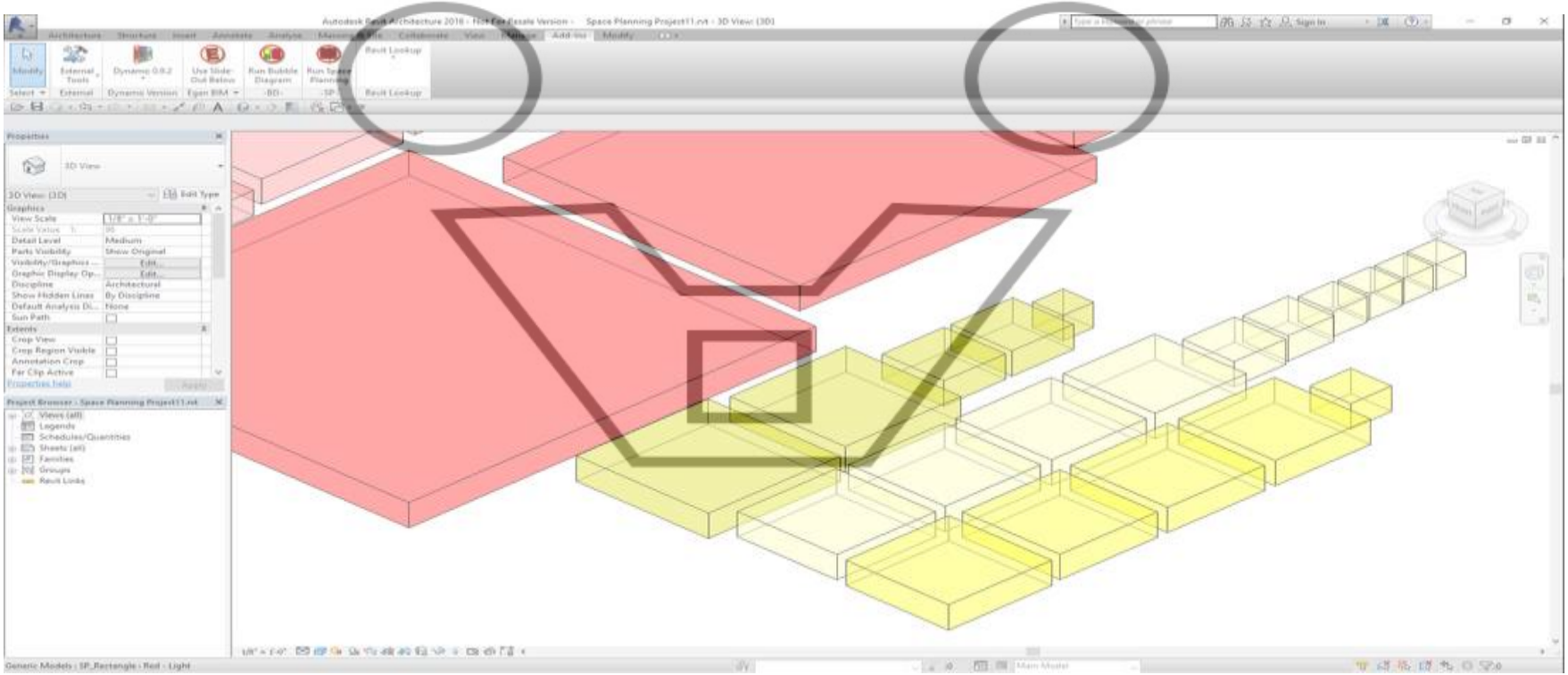
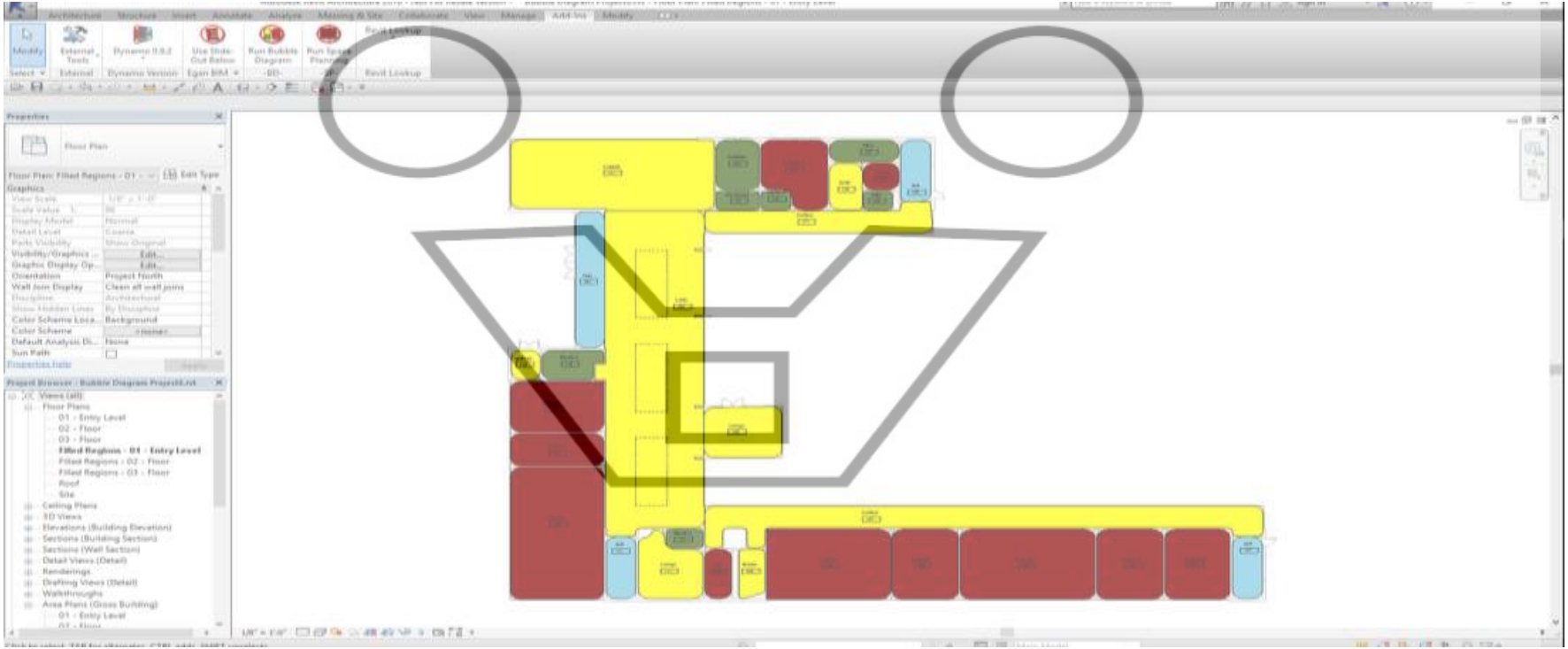
EGAN BIM RESOURCES: SPACE PLANNING

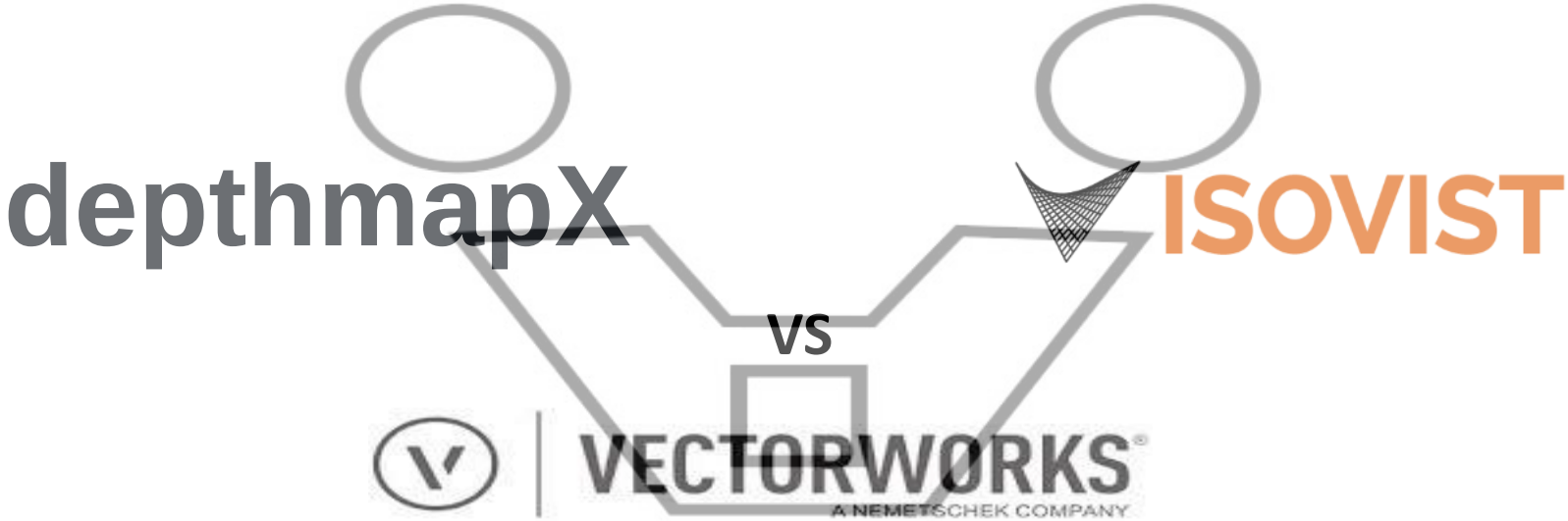


SPACE PROGRAMMING & PLANNING USANDO STRUMENTI COMPUTAZIONALI

EGAN BIM RESOURCES: BUBBLE GRAPH

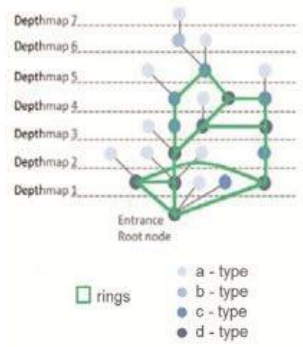


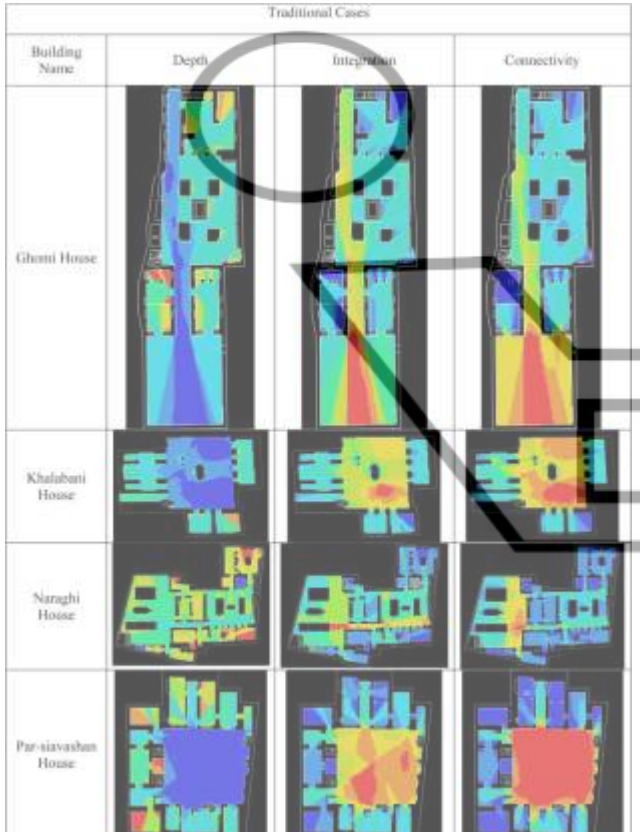
VALUTARE QUALITA' ED EFFICIENZA DEL LAYOUT



Space/Humans interactions

UCL Space Syntax **depthmapX**





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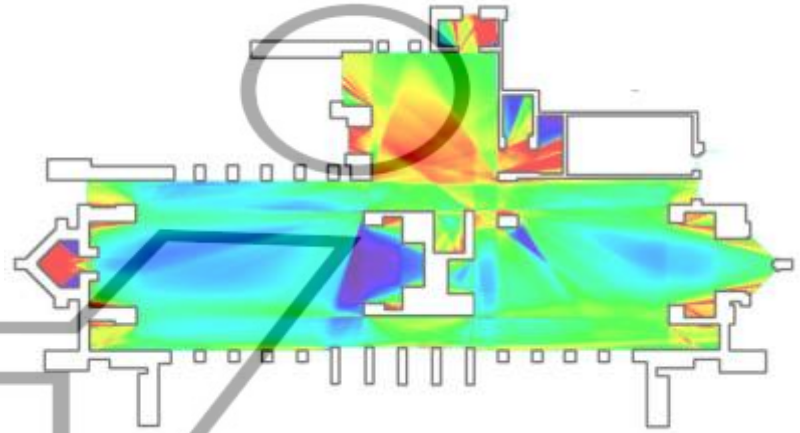
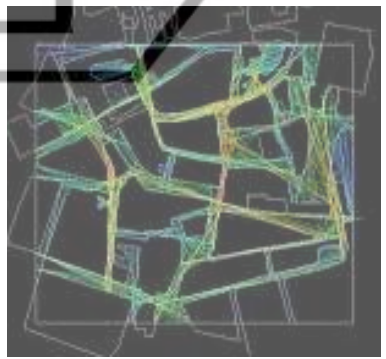
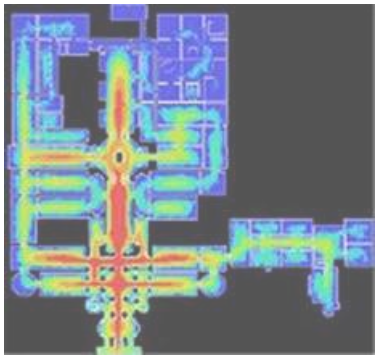


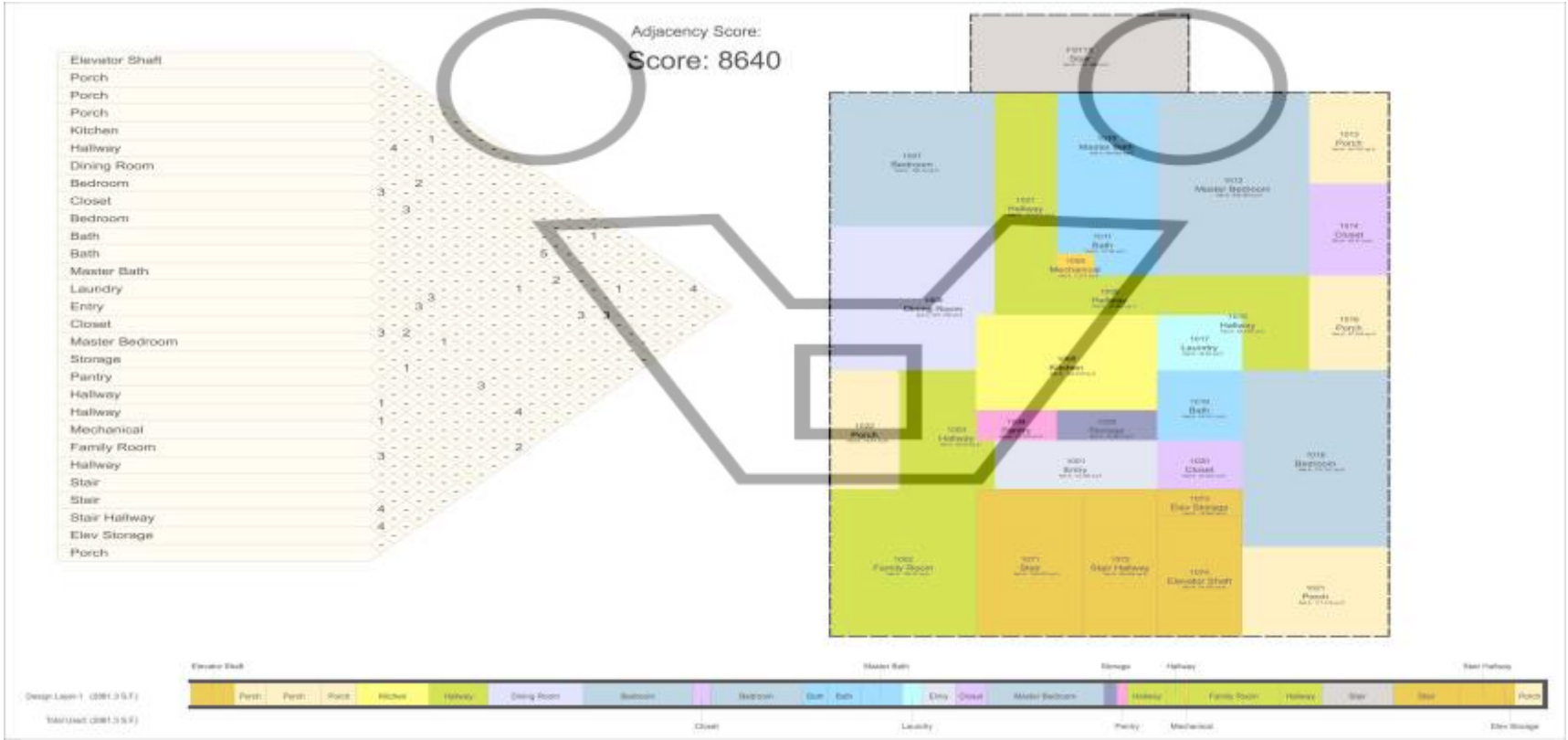




VECTORWORKS A NEMETSCHEK COMPANY

SPACE LAYOUT EFFICIENCY OPTIMIZATION: ALTERNATIVES EVALUATION

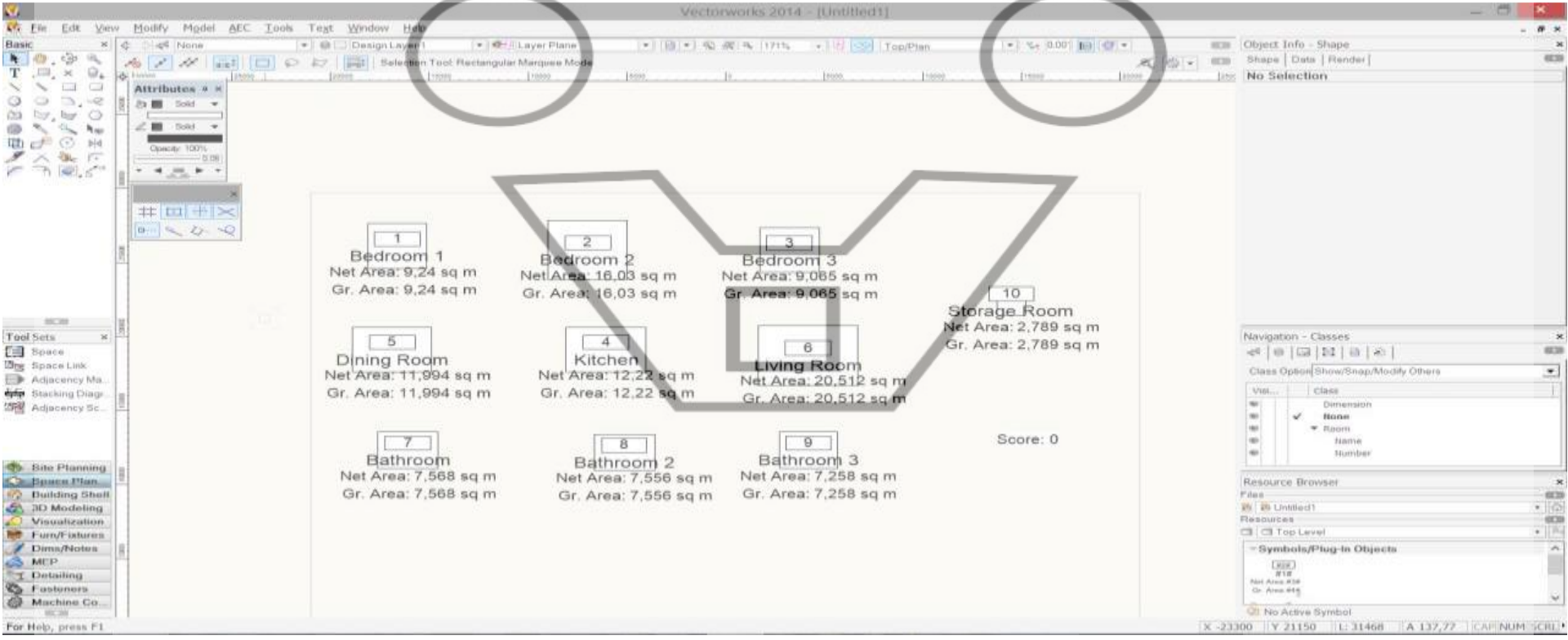
https://www.youtube.com/watch?v=F6CKvK9otqg&list=PLbOQw_r4cqHvvYNpM9q2SqG3wNg7JNhIr



VECTORWORKS A NEMETSCHEK COMPANY

SPACE LAYOUT EFFICIENCY OPTIMIZATION: ALTERNATIVES EVALUATION

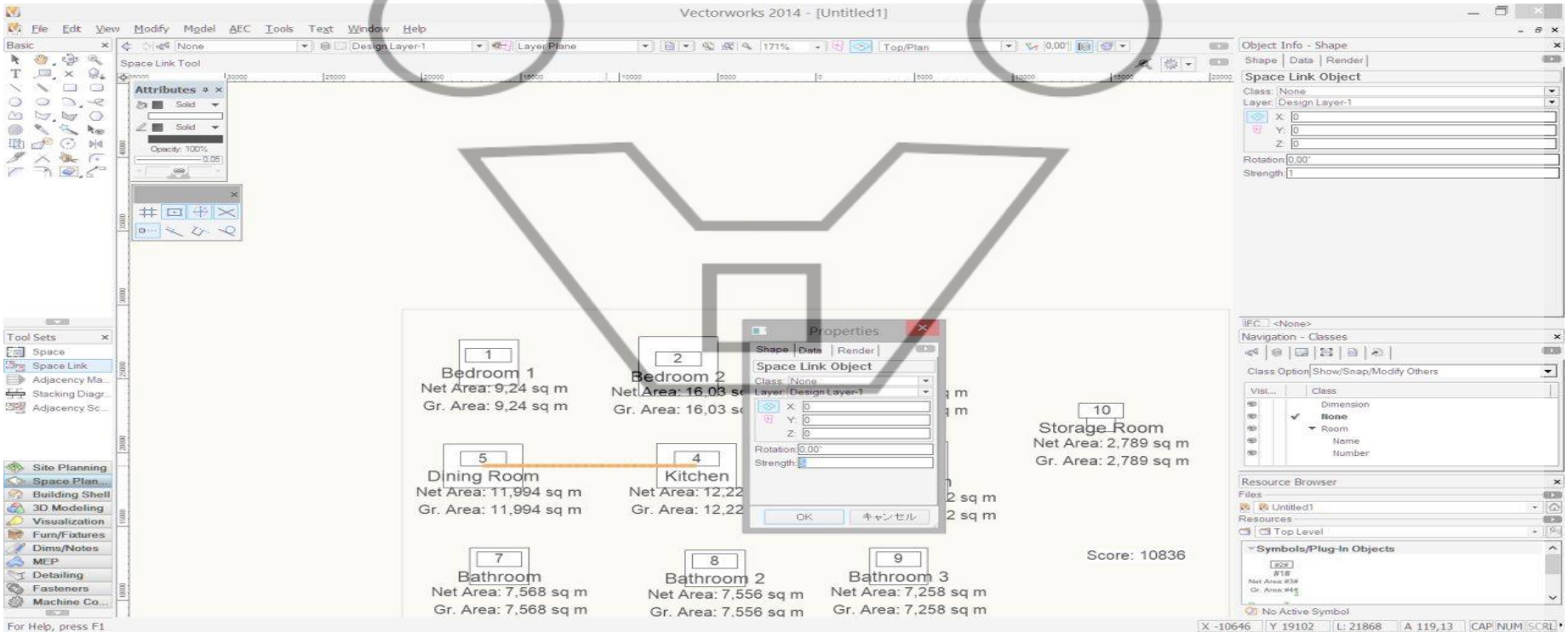
1. Definire gli spazi



VECTORWORKS A NEMETSCHEK COMPANY

SPACE LAYOUT EFFICIENCY OPTIMIZATION: ALTERNATIVES EVALUATION

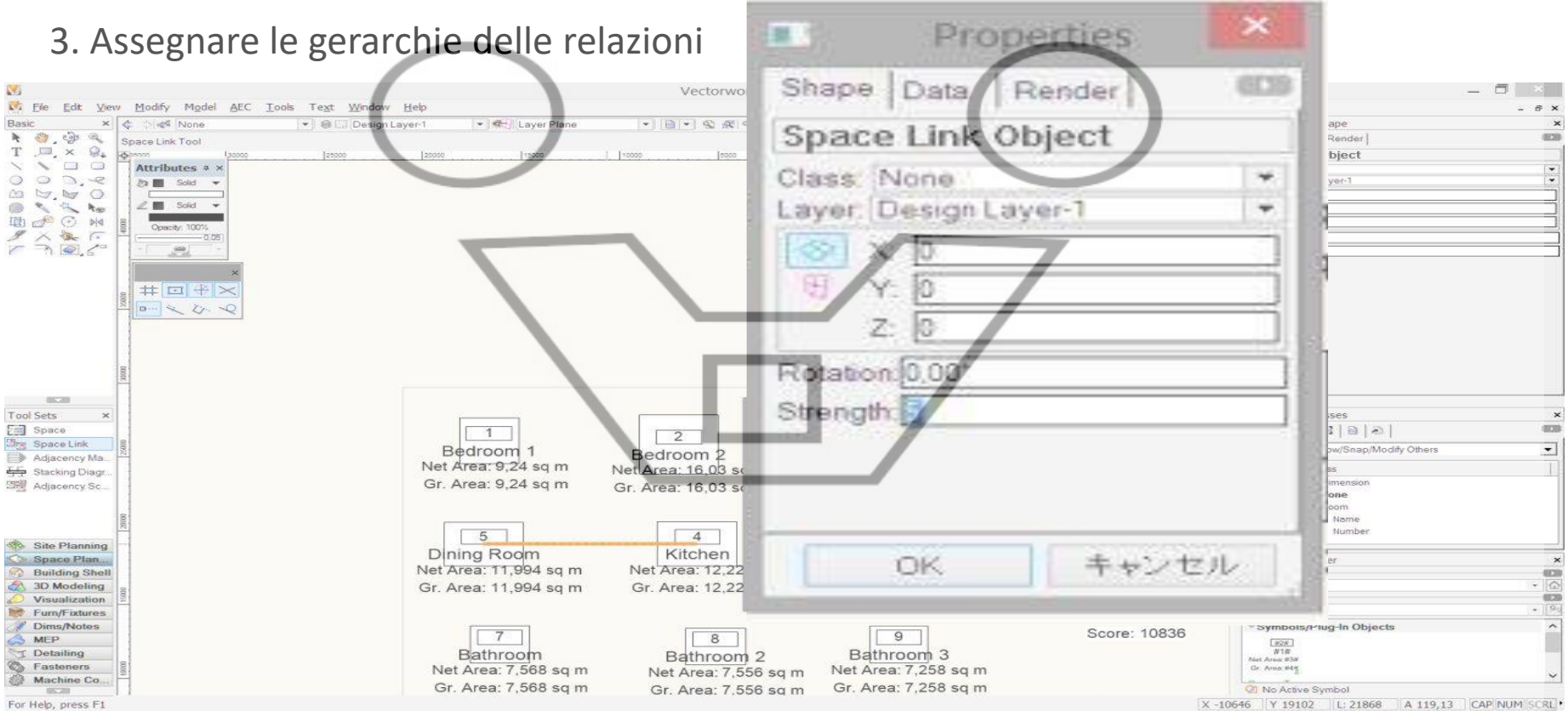
2. Stabilire le relazioni spaziali



VECTORWORKS A NEMETSCHEK COMPANY

SPACE LAYOUT EFFICIENCY OPTIMIZATION: ALTERNATIVES EVALUATION

3. Assegnare le gerarchie delle relazioni



VECTORWORKS A NEMETSCHEK COMPANY

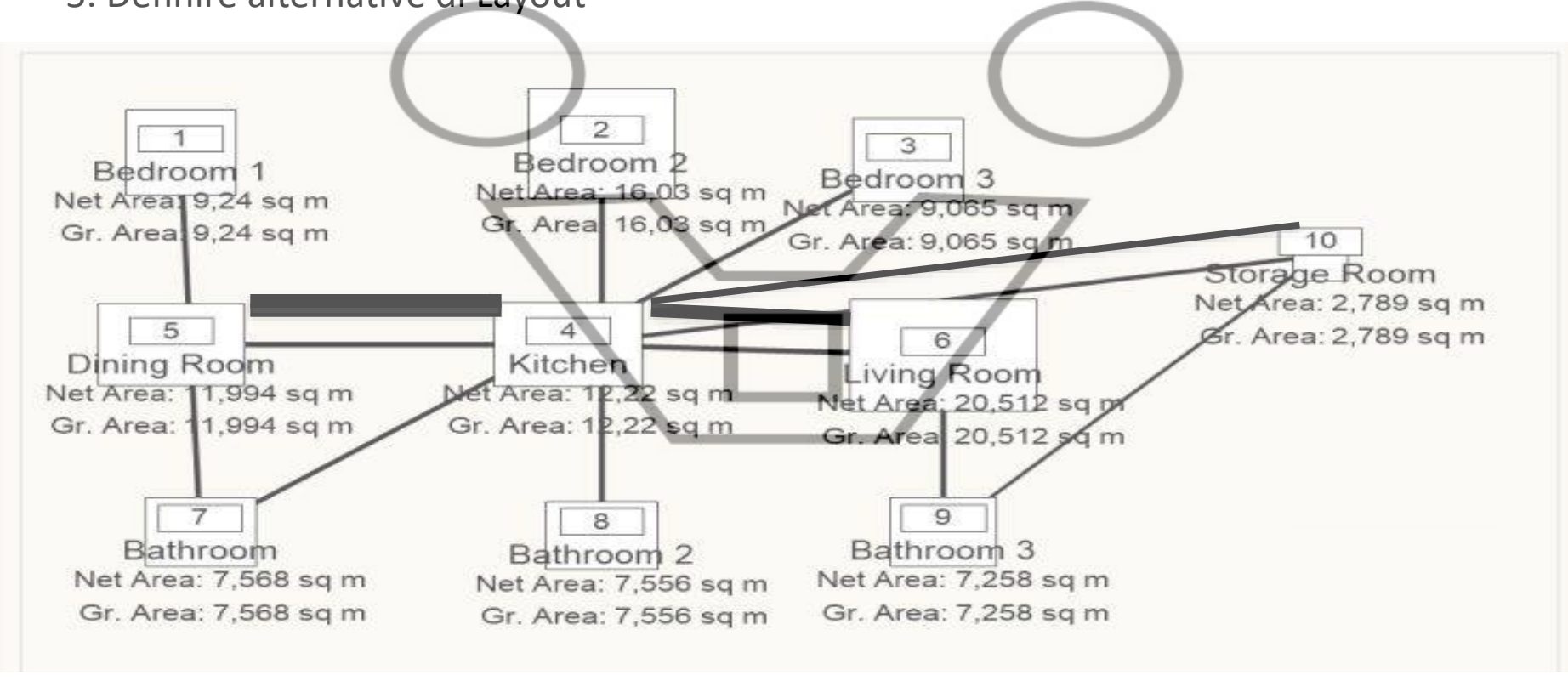
SPACE LAYOUT EFFICIENCY OPTIMIZATION: ALTERNATIVES EVALUATION

4. Visualizzare le relazioni spaziali

VECTORWORKS A NEMETSCHEK COMPANY

SPACE LAYOUT EFFICIENCY OPTIMIZATION: ALTERNATIVES EVALUATION

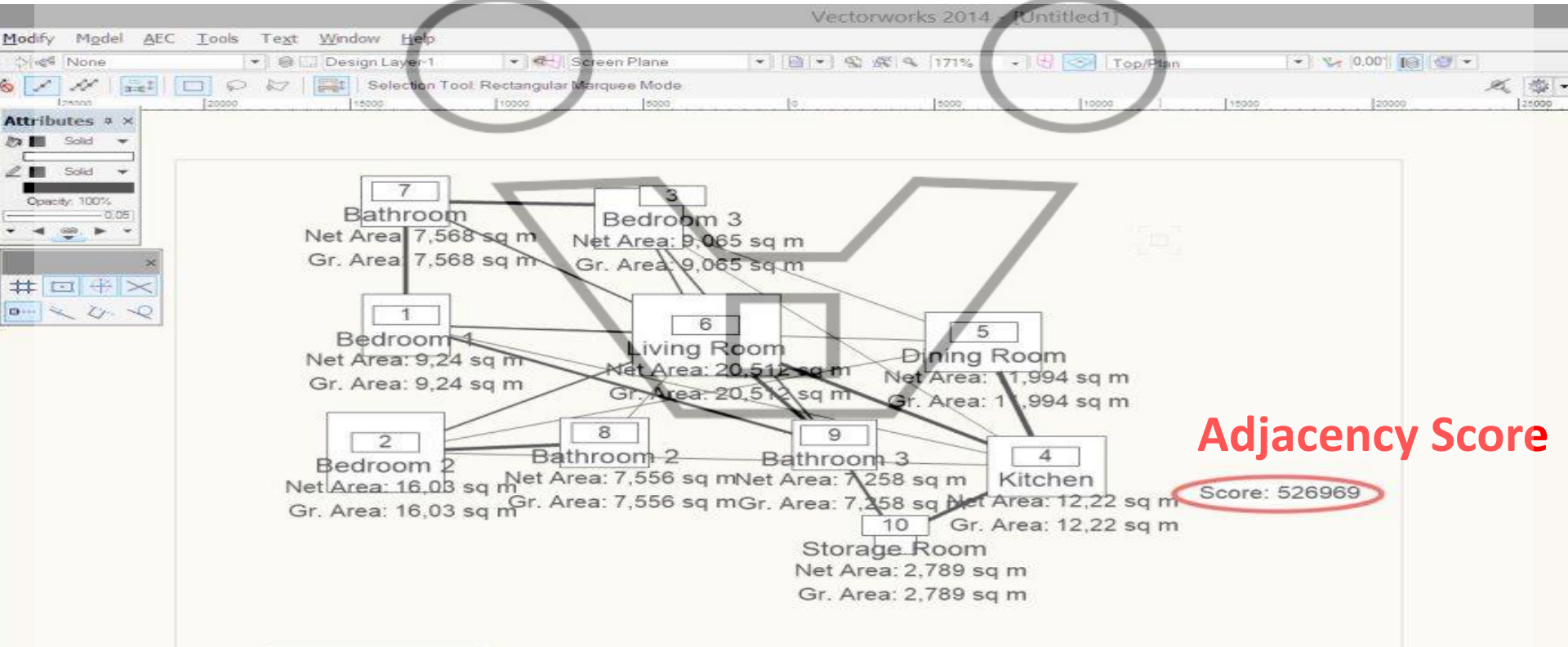
5. Definire alternative di Layout



VECTORWORKS A NEMETSCHEK COMPANY

SPACE LAYOUT EFFICIENCY OPTIMIZATION: ALTERNATIVES EVALUATION

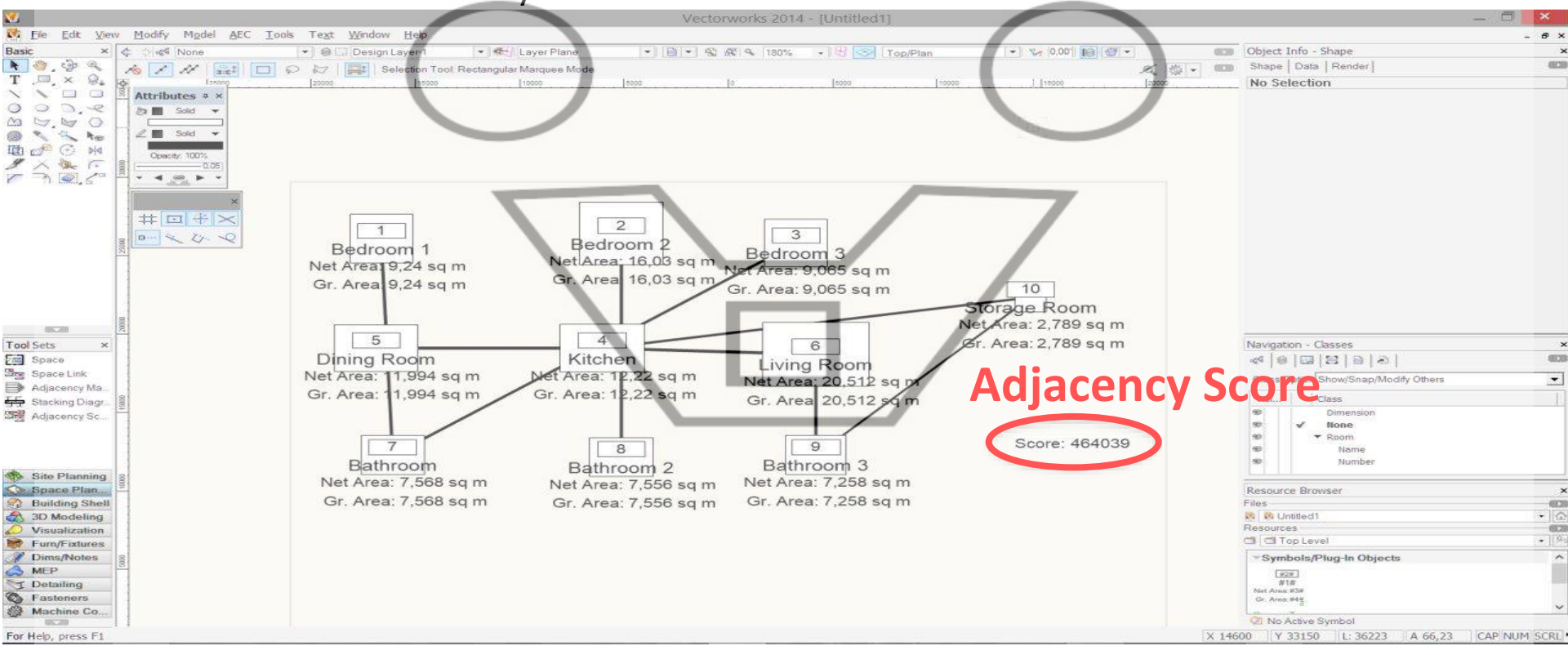
6. Valutare l'efficienza del layout (centralità del grafo)



VECTORWORKS A NEMETSCHEK COMPANY

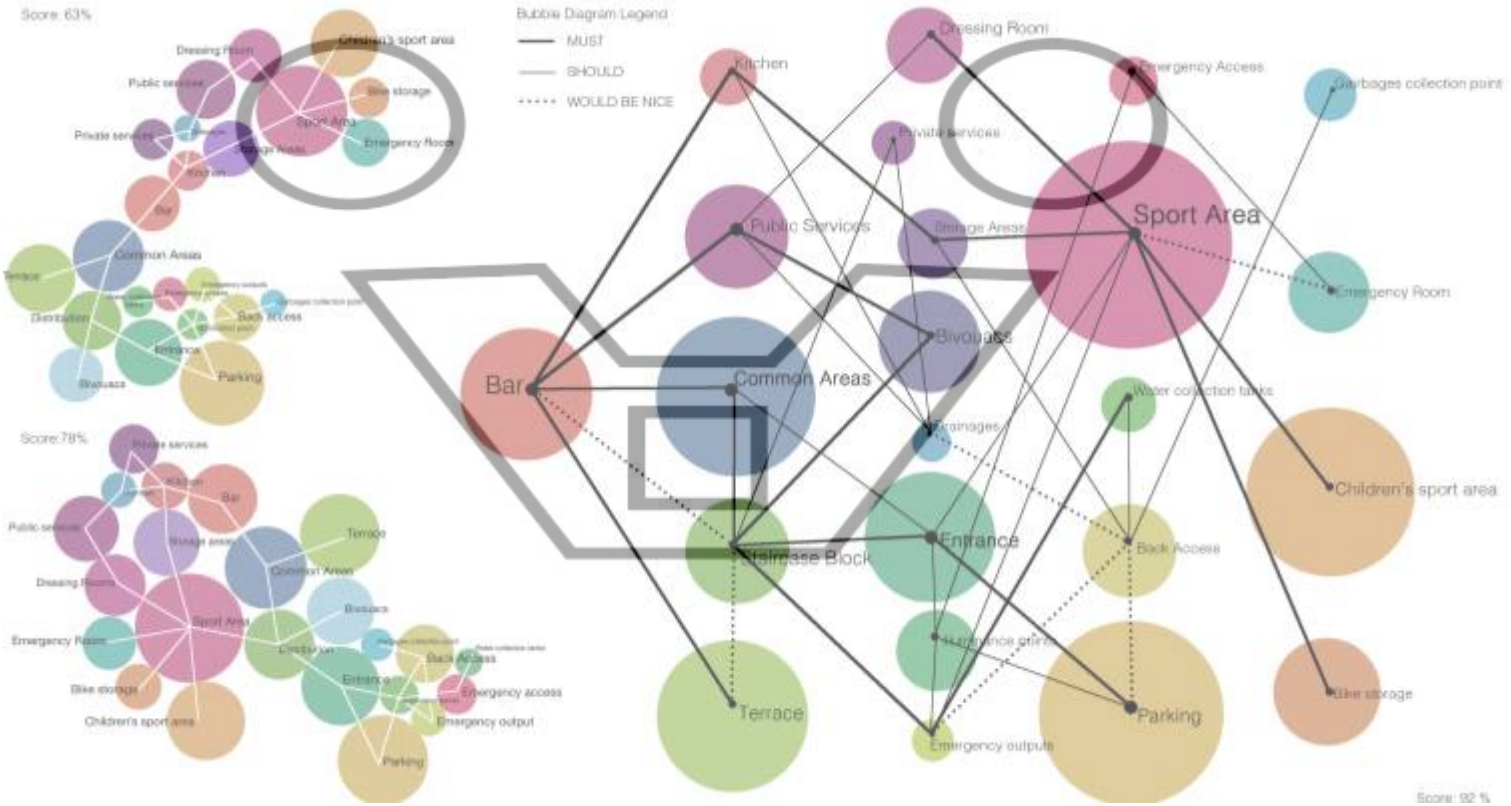
SPACE LAYOUT EFFICIENCY OPTIMIZATION: ALTERNATIVES EVALUATION

7. Modificare e valutare Layout alternativi



BIM nelle fasi iniziali dei processi d' intervento edilizio

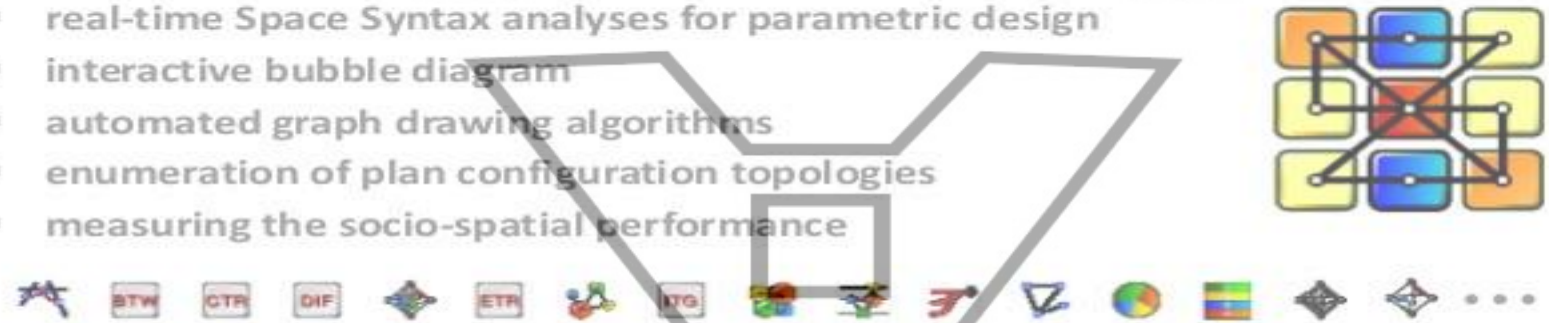
La simulazione computazionale per la redazione del progetto di fattibilità tecnica ed economica.



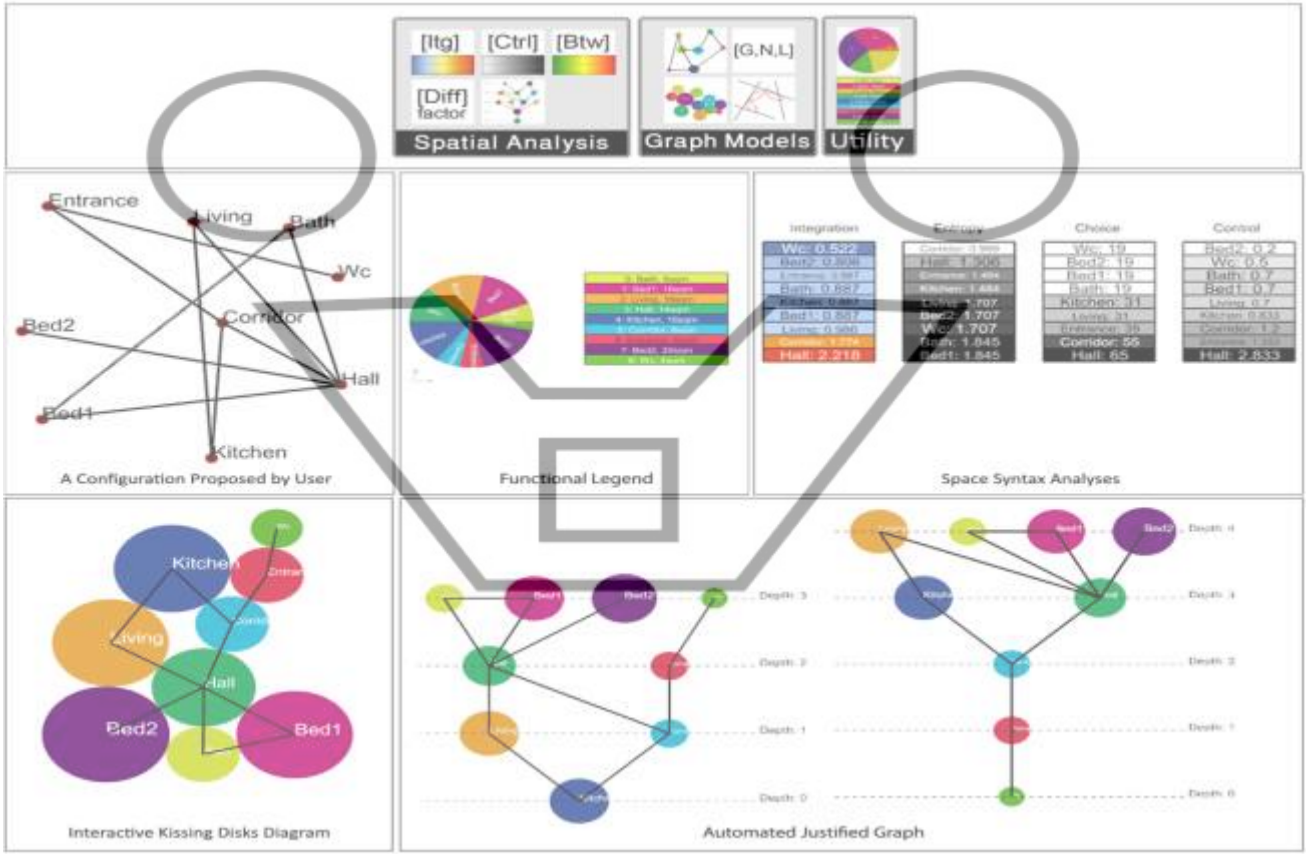
SYNTACTIC: SPACE SYNTAX GRASSHOPPER PATCH

SYNTACTIC
(Space Syntax for Generative Design)

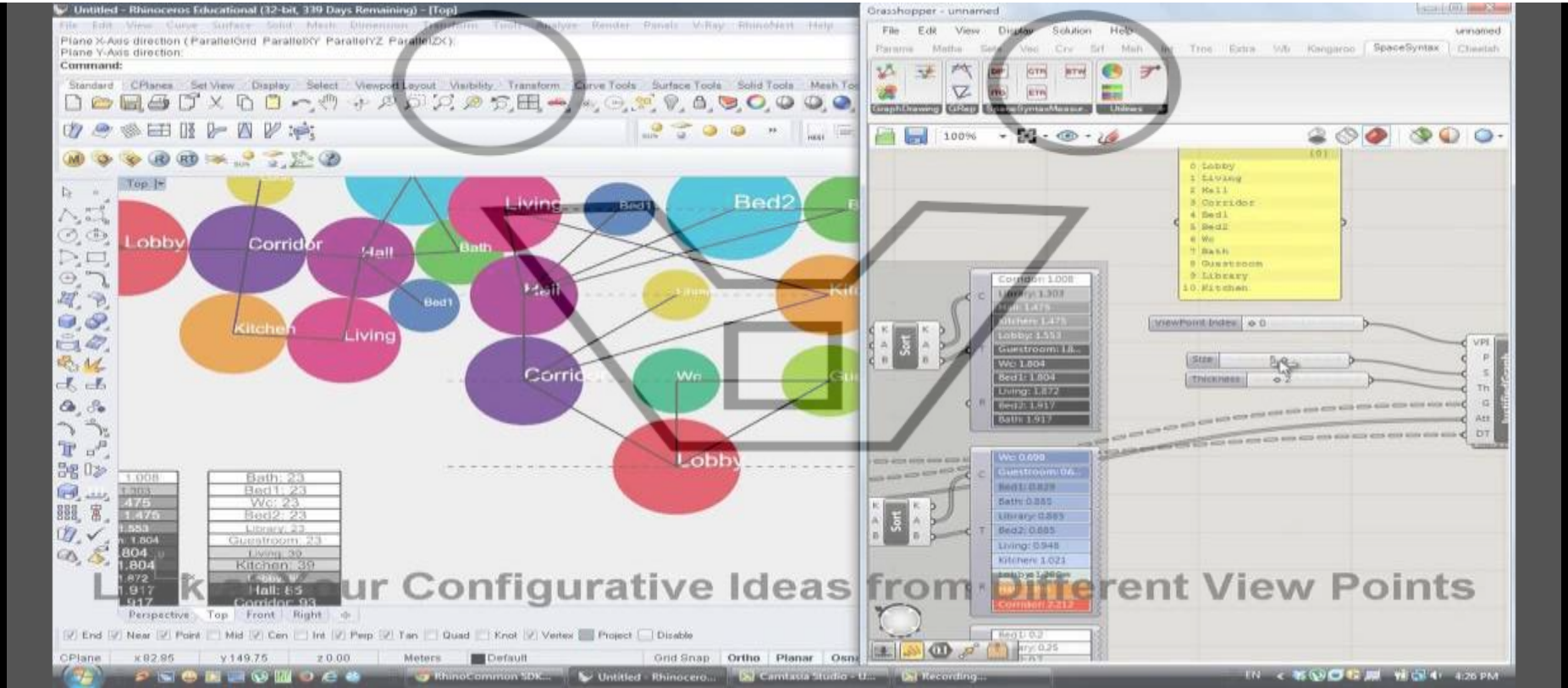
- real-time Space Syntax analyses for parametric design
- interactive bubble diagram
- automated graph drawing algorithms
- enumeration of plan configuration topologies
- measuring the socio-spatial performance



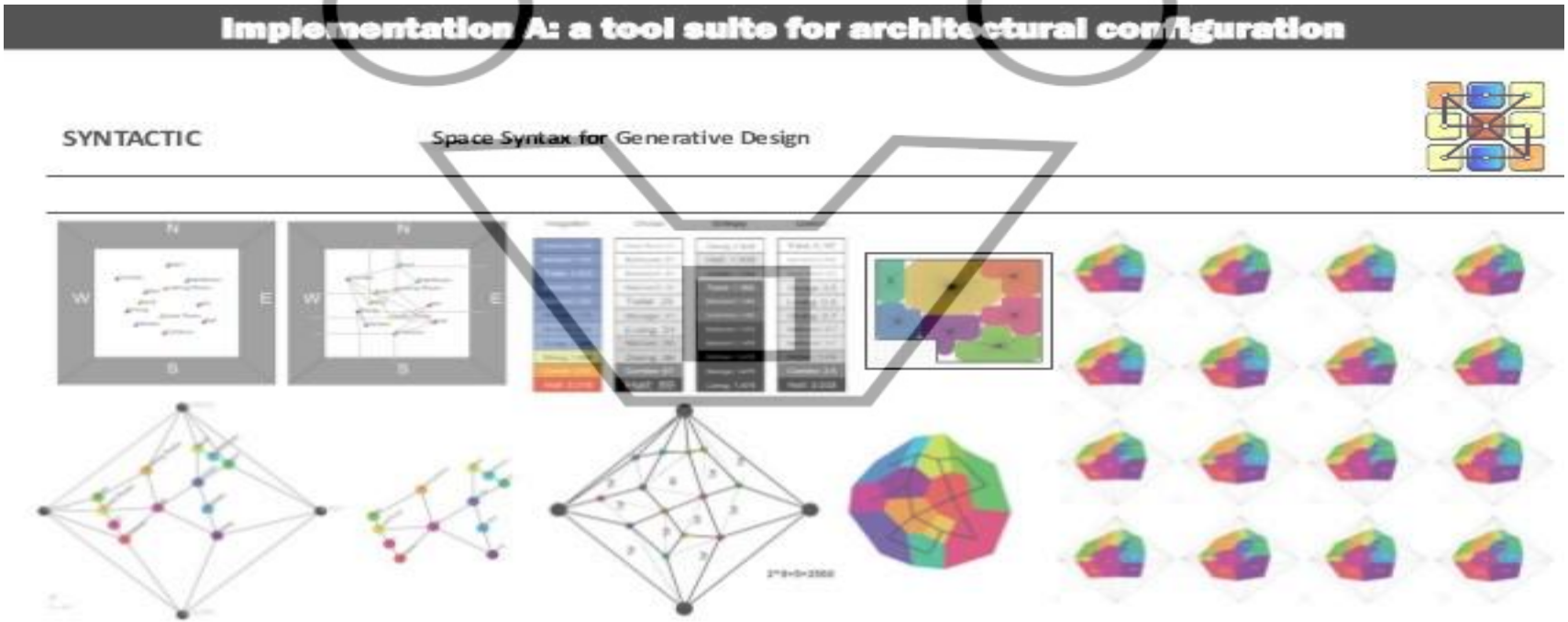
SYNTACTIC: SPACE SYNTAX GRASSHOPPER PATCH



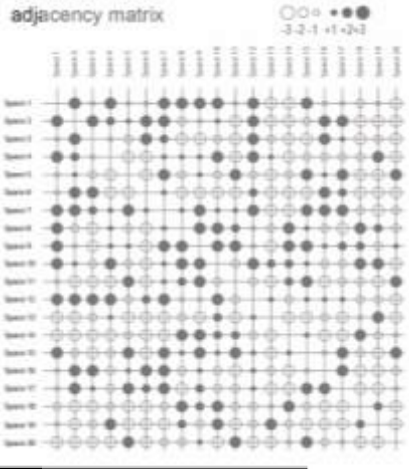
SYNTACTIC: SPACE SYNTAX GRASSHOPPER PATCH

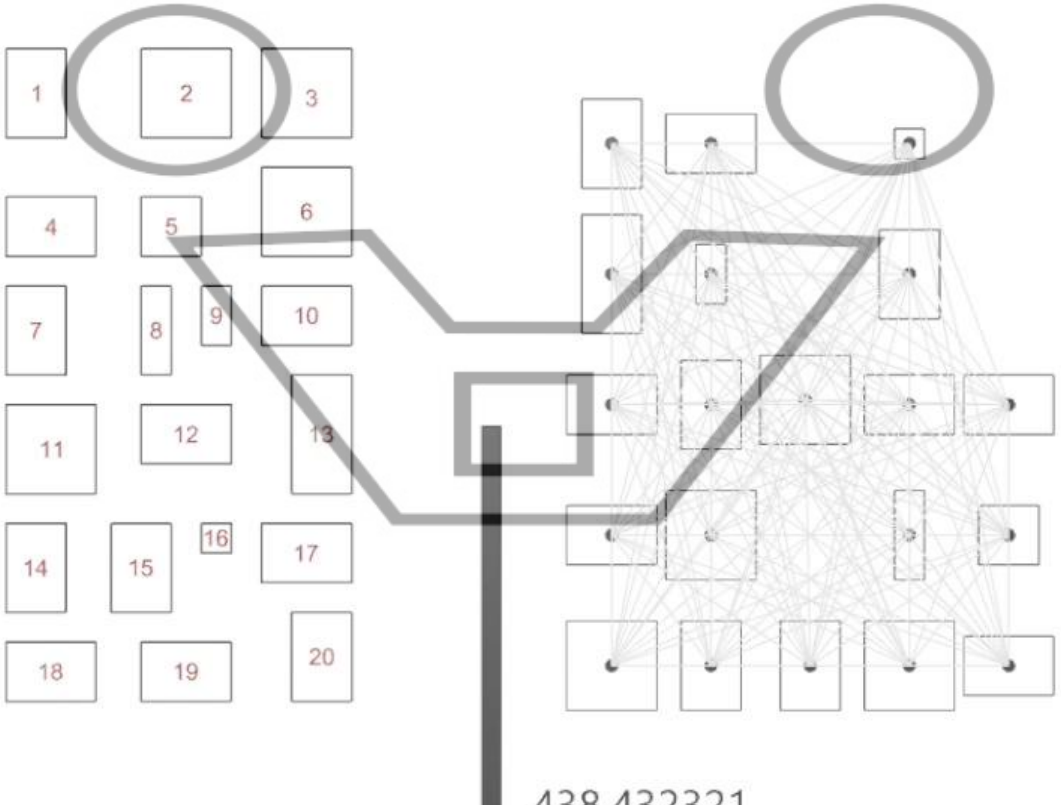


SYNTACTIC: SPACE SYNTAX GRASSHOPPER PATCH

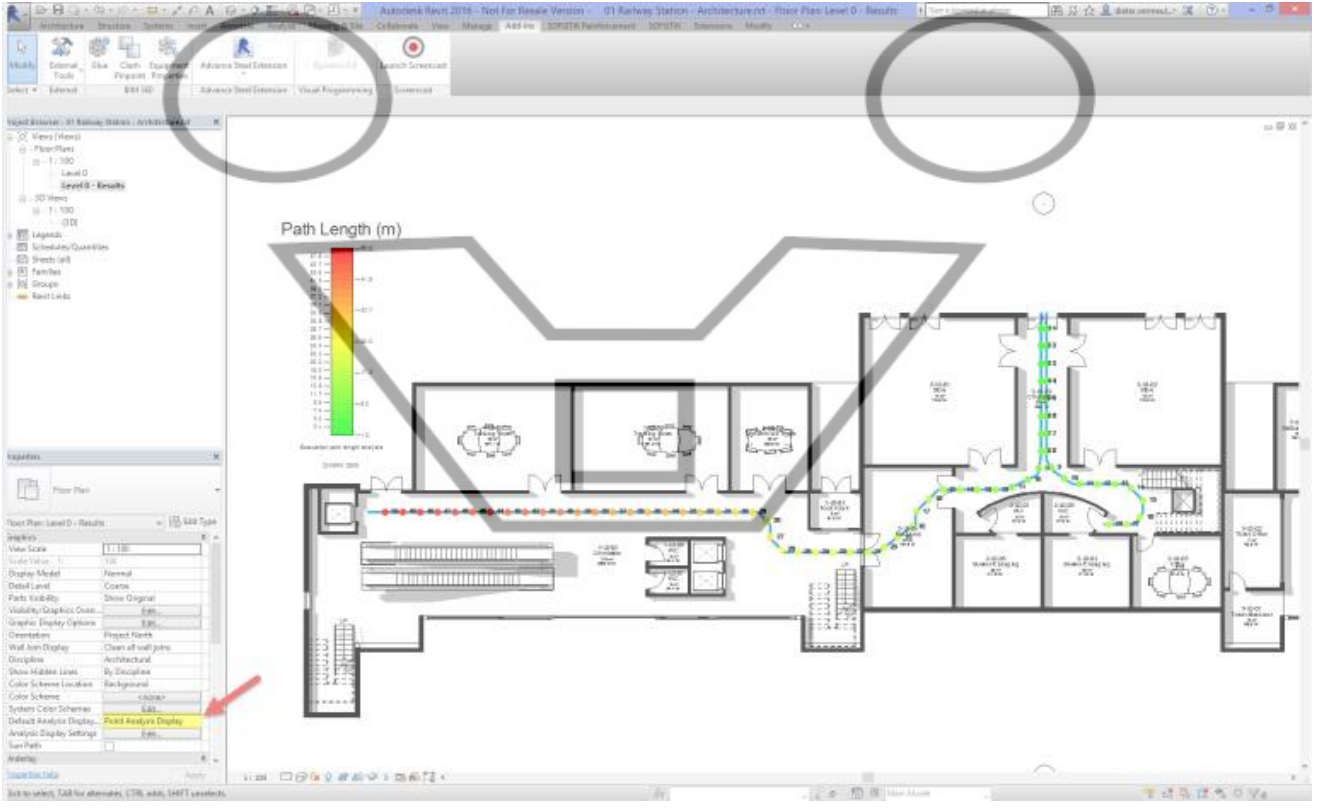


LAYOUT OPTIMIZATION USING EVOLUTIONARY ALGORITHMS



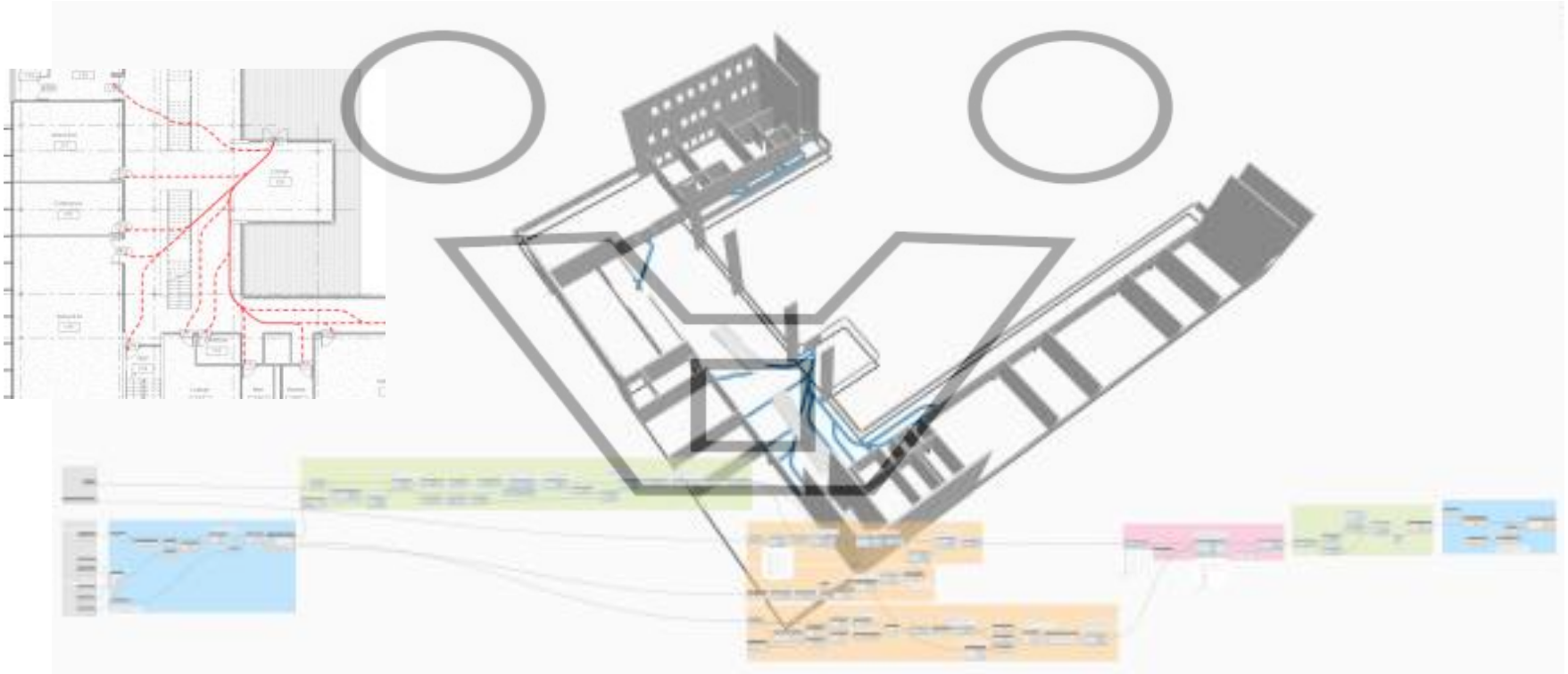


Evacuation Planning Tool (**EPT**) for Emergency on DYNAMO



SPECIALIZED LAYOUT PLUG-IN & SCRIPT FOR REVIT

Fire Exit Risk Assessment in Revit



https://revitbeyondbim.wordpress.com/2017/01/03/fire-exit-risk-assessment-with-revit-and-dynamo/

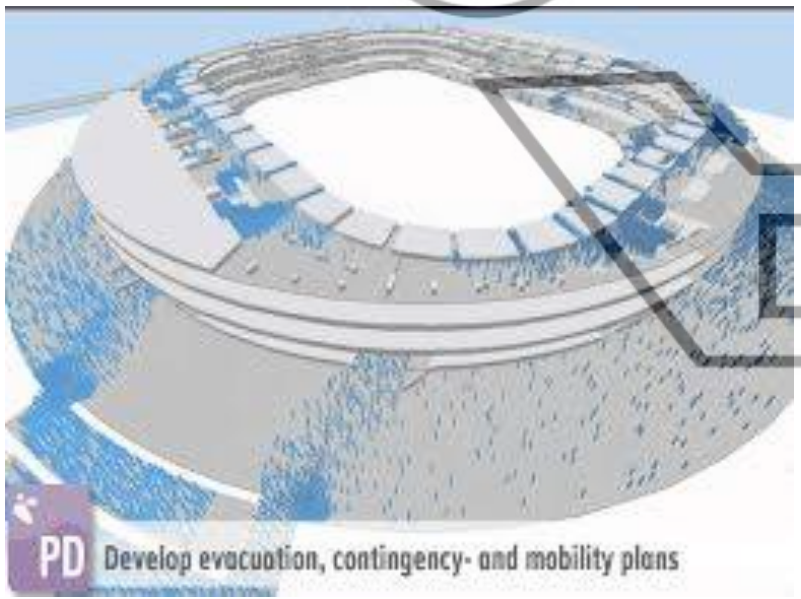
REAL TIME SIMULATION SOFTWARE USING PARTICLES AGENT-BASE MODELING

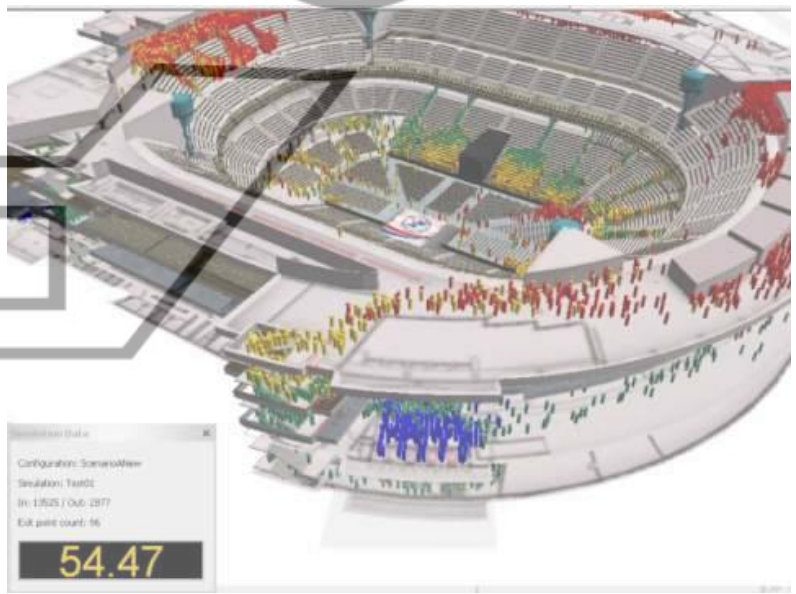
Pathfinder for evacuation simulation

https://www.thunderheadeng.com/pathfinder/

REAL TIME SIMULATION SOFTWARE USING PARTICLES AGENT-BASE MODELING

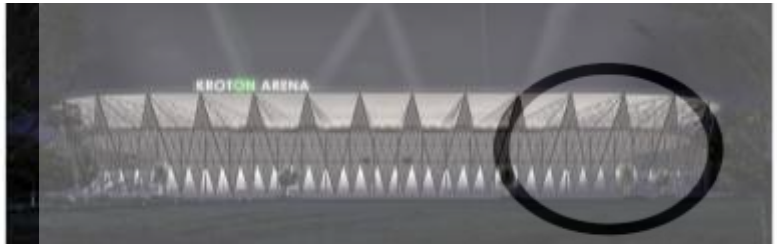
Evacuation Planning Tool (**EPT**) for Emergency, Event

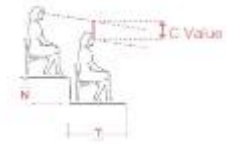


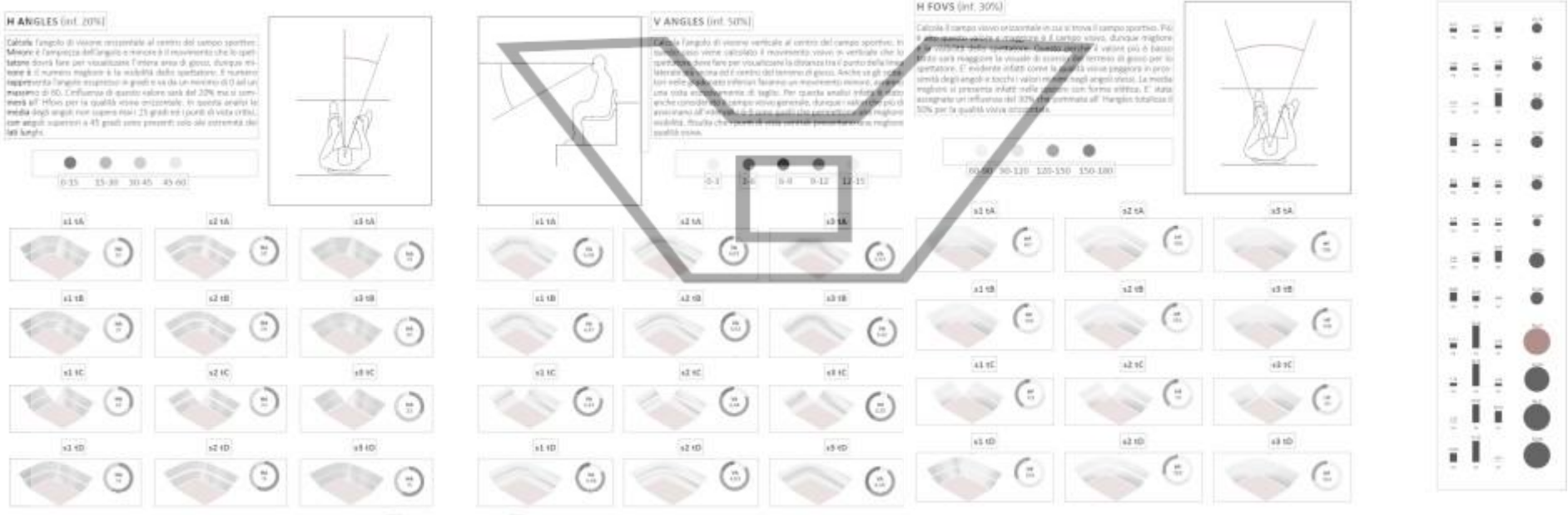


OTHER SIMULATION SOFTWARE FOR LAYOUT OPTIMIZATION

Bowl Bulider a Grasshopper Library







ESERCITAZIONE #01

***A** Programma edilizio.*
Elaborato rappresentante, in una scala opportuna, le planimetrie con indicazione delle aree omogenee funzionali, corrispondente abaco dei locali da redigere in conformità con il Decreto Ministeriale 18 dicembre 1975, stima parametrica dei costi e scostamenti da valori di programma.

***B** Calcolo dell'incidenza della murature.*
Elaborato da cui evidenziare la quantità di murature in rapporto alla superficie totale e superficie netta.

***A** Programma edilizio.*

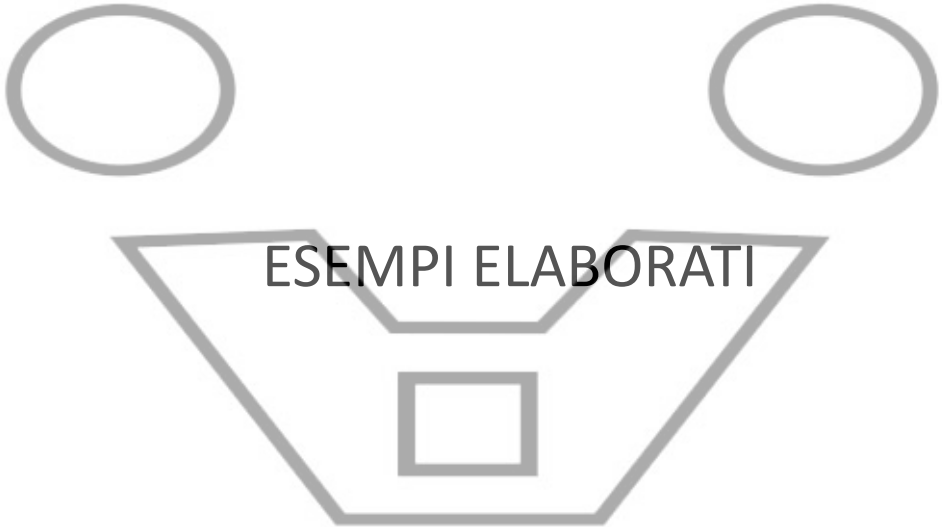
L'abaco dei vani, indicizzato per aree funzionali omogenee (aree comuni, circolazione, attività didattiche normali,…), dovrà contenere e specificare, al minimo, i seguenti campi:

- aree funzionali
- numero di piano
- identificativo del locale
- denominazione del locale
- superficie di progetto (campo con valore estratto in automatico)
- superficie di standard (campo con valore assegnato)
- differenza di superficie (campo con valore calcolato)
- costo standard per superficie diviso in aree di basso-medio-alto valore da definire sulla base delle informazioni ricevute nei moduli didattici relativi alla stima economica (campo con valore assegnato)
- costo di progetto (campo con valore calcolato)
- differenza di costo rispetto all'applicazione delle superfici di normativa (campo con valore calcolato)

***B** Calcolo dell'incidenza della murature*

Elaborato da cui evidenziare la quantità di murature in rapporto alla superficie totale e superficie netta. I richiesti valori dovranno essere estratti utilizzando le funzioni automatiche presenti in Revit impiegando, a scelta o in combinazione, l'abaco muri, aree e relativo abaco, delimitatori di aree e/o locali.

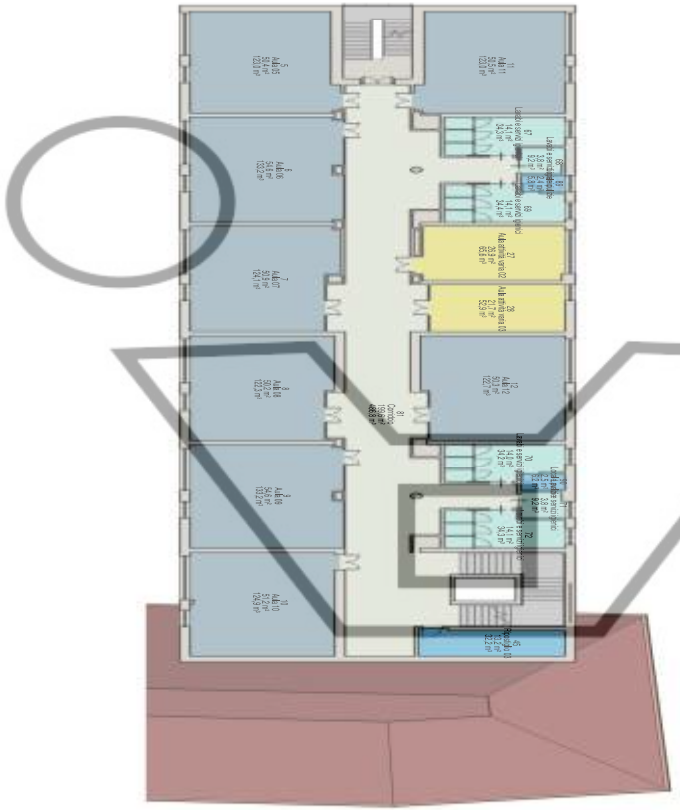
Non è quindi ammessa alcuna modalità di tipo manuale.



ESEMPI ELABORATI

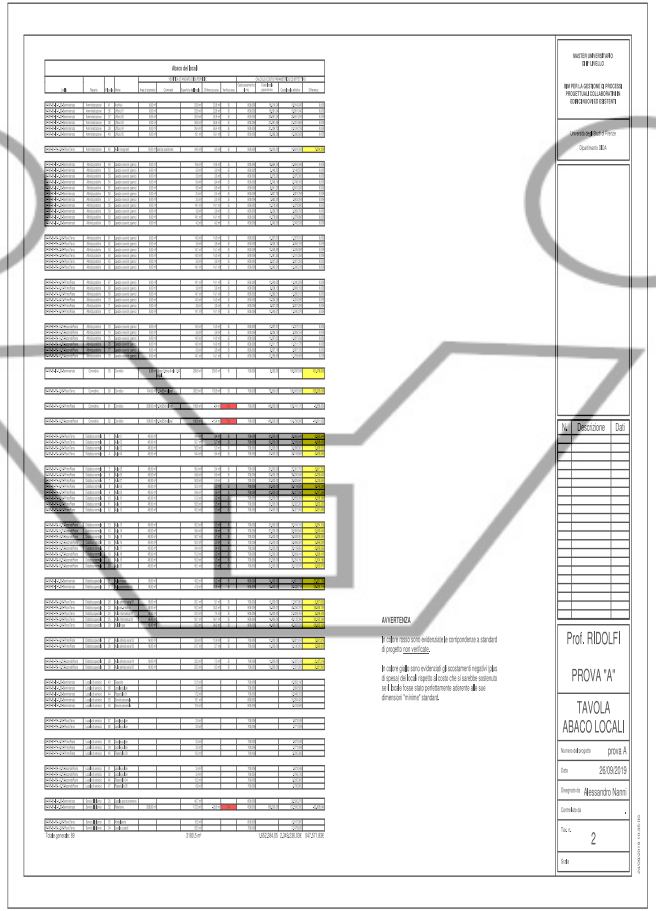
BIM nelle fasi iniziali dei processi d' intervento edilizio

La simulazione computazionale per la redazione del progetto di fattibilità tecnica ed economica.



BIM nelle fasi iniziali dei processi d' intervento edilizio

La simulazione computazionale per la redazione del progetto di fattibilità tecnica ed economica.

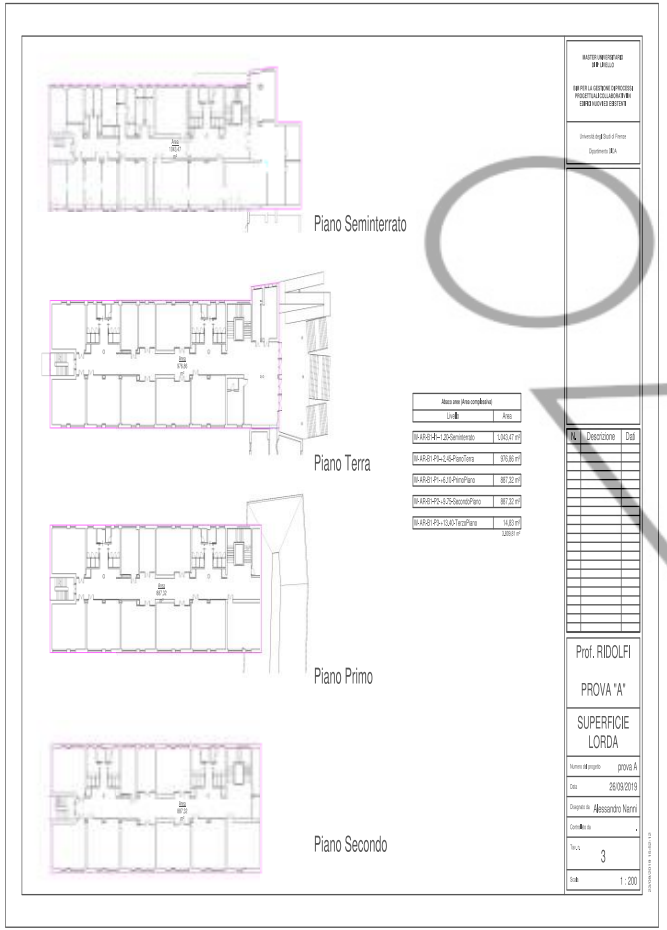


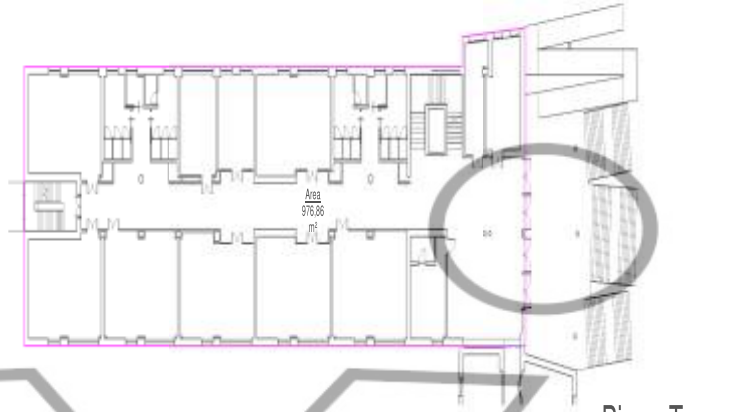
Abaco dei locali

				VERIFICA STANDARD DI SUPERFICIE					CALCOLO COSTO PARAMETRICO ED EFFETTIVO			
Livello	Reparto	N° locale	Nome	Area di standard	Commenti	Superficie del locale	Differenza area	Verifica area	Costo parametrico al mq	Costo locale parametrico	Costo locale effettivo	Differenza
W-AR-B1-H--1.20-Seminterrato	Amministrazione	41	Archivio	0,00 m²		23,8 m²	23,8 m²	Sì	800,00€	19.014,24	19.014,24€	0,00€
W-AR-B1-H--1.20-Seminterrato	Amministrazione	36	Ufficio 01	0,00 m²		23,9 m²	23,9 m²	Sì	800,00€	19.091,04	19.091,04€	0,00€
W-AR-B1-H--1.20-Seminterrato	Amministrazione	37	Ufficio 02	0,00 m²		25,9 m²	25,9 m²	Sì	800,00€	20.691,20	20.691,20€	0,00€
W-AR-B1-H--1.20-Seminterrato	Amministrazione	38	Ufficio 03	0,00 m²		26,6 m²	26,6 m²	Sì	800,00€	21.291,68	21.291,68€	0,00€
W-AR-B1-H--1.20-Seminterrato	Amministrazione	39	Ufficio 04	0,00 m²		26,4 m²	26,4 m²	Sì	800,00€	21.124,72	21.124,72€	0,00€
W-AR-B1-H--1.20-Seminterrato	Amministrazione	40	Ufficio 05	0,00 m²		19,1 m²	19,1 m²	Sì	800,00€	15.296,58	15.296,58€	0,00€
W-AR-B1-P0-+2.45-PianoTerra	Amministrazione	42	Aula insegnanti	15,00 m²	stanza assistente	24,5 m²	9,5 m²	Sì	800,00€	12.000,00	19.624,32€	7.624,32€
W-AR-B1-H--1.20-Seminterrato	Attività pratiche	49	Lavabi e servizi igienici	0,00 m²		19,6 m²	19,6 m²	Sì	800,00€	15.664,34	15.664,34€	0,00€
W-AR-B1-H--1.20-Seminterrato	Attività pratiche	52	Lavabi e servizi igienici	0,00 m²		3,9 m²	3,9 m²	Sì	800,00€	3.148,52	3.148,52€	0,00€
W-AR-B1-H--1.20-Seminterrato	Attività pratiche	53	Lavabi e servizi igienici	0,00 m²		3,6 m²	3,6 m²	Sì	800,00€	2.875,36	2.875,36€	0,00€
W-AR-B1-H--1.20-Seminterrato	Attività pratiche	54	Lavabi e servizi igienici	0,00 m²		8,4 m²	8,4 m²	Sì	800,00€	6.746,16	6.746,16€	0,00€
W-AR-B1-H--1.20-Seminterrato	Attività pratiche	55	Lavabi e servizi igienici	0,00 m²		8,6 m²	8,6 m²	Sì	800,00€	6.841,20	6.841,20€	0,00€
W-AR-B1-H--1.20-Seminterrato	Attività pratiche	56	Lavabi e servizi igienici	0,00 m²		2,4 m²	2,4 m²	Sì	800,00€	1.921,76	1.921,76€	0,00€
W-AR-B1-H--1.20-Seminterrato	Attività pratiche	57	Lavabi e servizi igienici	0,00 m²		2,5 m²	2,5 m²	Sì	800,00€	1.963,20	1.963,20€	0,00€
W-AR-B1-H--1.20-Seminterrato	Attività pratiche	58	Lavabi e servizi igienici	0,00 m²		14,1 m²	14,1 m²	Sì	800,00€	11.279,99	11.279,99€	0,00€
W-AR-B1-H--1.20-Seminterrato	Attività pratiche	59	Lavabi e servizi igienici	0,00 m²		3,8 m²	3,8 m²	Sì	800,00€	3.059,76	3.059,76€	0,00€
W-AR-B1-H--1.20-Seminterrato	Attività pratiche	60	Lavabi e servizi igienici	0,00 m²		14,1 m²	14,1 m²	Sì	800,00€	11.279,99	11.279,99€	0,00€
W-AR-B1-H--1.20-Seminterrato	Attività pratiche	79	Lavabi e servizi igienici	0,00 m²		4,2 m²	4,2 m²	Sì	800,00€	3.342,53	3.342,53€	0,00€
W-AR-B1-P0-+2.45-PianoTerra	Attività pratiche	61	Lavabi e servizi igienici	0,00 m²		14,0 m²	14,0 m²	Sì	800,00€	11.207,01	11.207,01€	0,00€
W-AR-B1-P0-+2.45-PianoTerra	Attività pratiche	62	Lavabi e servizi igienici	0,00 m²		3,8 m²	3,8 m²	Sì	800,00€	3.008,15	3.008,15€	0,00€

BIM nelle fasi iniziali dei processi d' intervento edilizio

La simulazione computazionale per la redazione del progetto di fattibilità tecnica ed economica.





Abaco aree (Area complessiva)	
Livello	Area
W-AR-B1-I1–1.20-Seminterrato	1.043,47 m²
W-AR-B1-P0-+2.45-PianoTerra	976,86 m²
W-AR-B1-P1-+6.10-PrimoPiano	887,32 m²
W-AR-B1-P2-+9.75-SecondoPiano	887,32 m²
W-AR-B1-P3-+13.40-TerzoPiano	14,83 m²
	3.809,81 m²