Welcome!

Computation, Parametrics and Data Analysis in Practice

September 22, 2015 2:00 PM - 3:00 PM EDT

Earn 1.0 AIA LU

Moderator

Robert Yori

Robert Yori is the Senior Digital Design Manager at Skidmore, Owings and Merrill in New York, where he explores innovative uses of technology to better design, visualize, and deliver SOM's projects. He manages technology-related R&D efforts, provides strategic guidance, designs and maintains learning curricula, and teaches. He co-leads Firmwide Digital Design initiatives including knowledge sharing, big data analysis, and computational design literacy. Robert is the 2016 Chair of TAP, an Advisory Board Member of the NYC College of Technology's Department of Architectural Technology, and co-leads the RTC Design Technology Summit. He has presented at ACADIA, Autodesk University, BIMForum, and RTC, has been published in DesignIntelligence and the Journal of Building Information Modeling.

Speaker

Nate Miller

Nate Miller is the founder of PROVING GROUND. His new business venture is focused on the innovative applications of data in the building industry. As a consultant, he has advised leaders and teams in some of the most reputable organizations in the building industry. Whether it is offering strategic insight or developing new computational workflows, Nate strives to help his clients leverage data to improve the building process. With deep project experience, Nate has worked with his clients to deliver leading-edge solutions for projects ranging from high-rise towers, corporate office spaces, mixed-use master plans, and Olympic-sized sports venues.

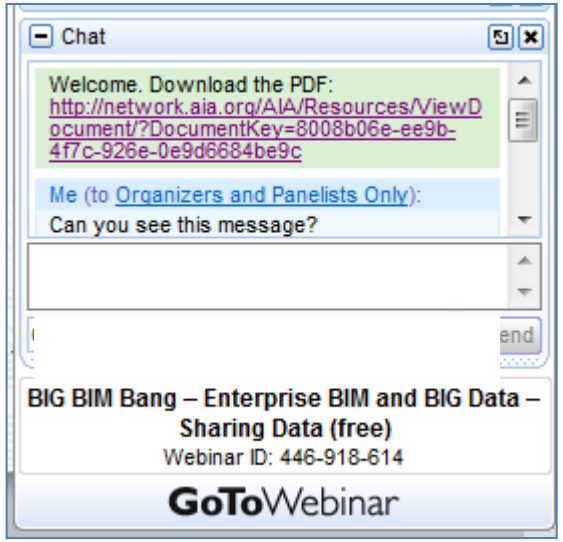
Speaker

Andrew Heumann

Andrew Heumann leads the Design Computation team at NBBJ, overseeing strategy, development, and implementation of computational tools for diverse projects and applications. He has developed a suite of tools for NBBJ's corporate and commercial practice, which aid in the management of project metrics, environmental and urban analysis, and façade design. Andrew is trained in both architecture and computer science, and has lectured and taught seminars at Cornell University, Yale University, California College of the Arts, and the University of Washington. His work has been published in Wallpaper magazine, CLOG journal, and presented at conferences including SIMAUD, ACADIA, the AEC Technology Symposium, and Facades+.

Questions?

Submit a question to the moderator via the chat box.



Content-related questions will be answered during the Q&A portion at the end as time allows.

Tech support questions will be answered by AIA staff promptly.

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Follow the link provided:

- **in the Chat box** at the conclusion of the live presentation;
- **in the follow-up email** you will receive one hour after the webinar.

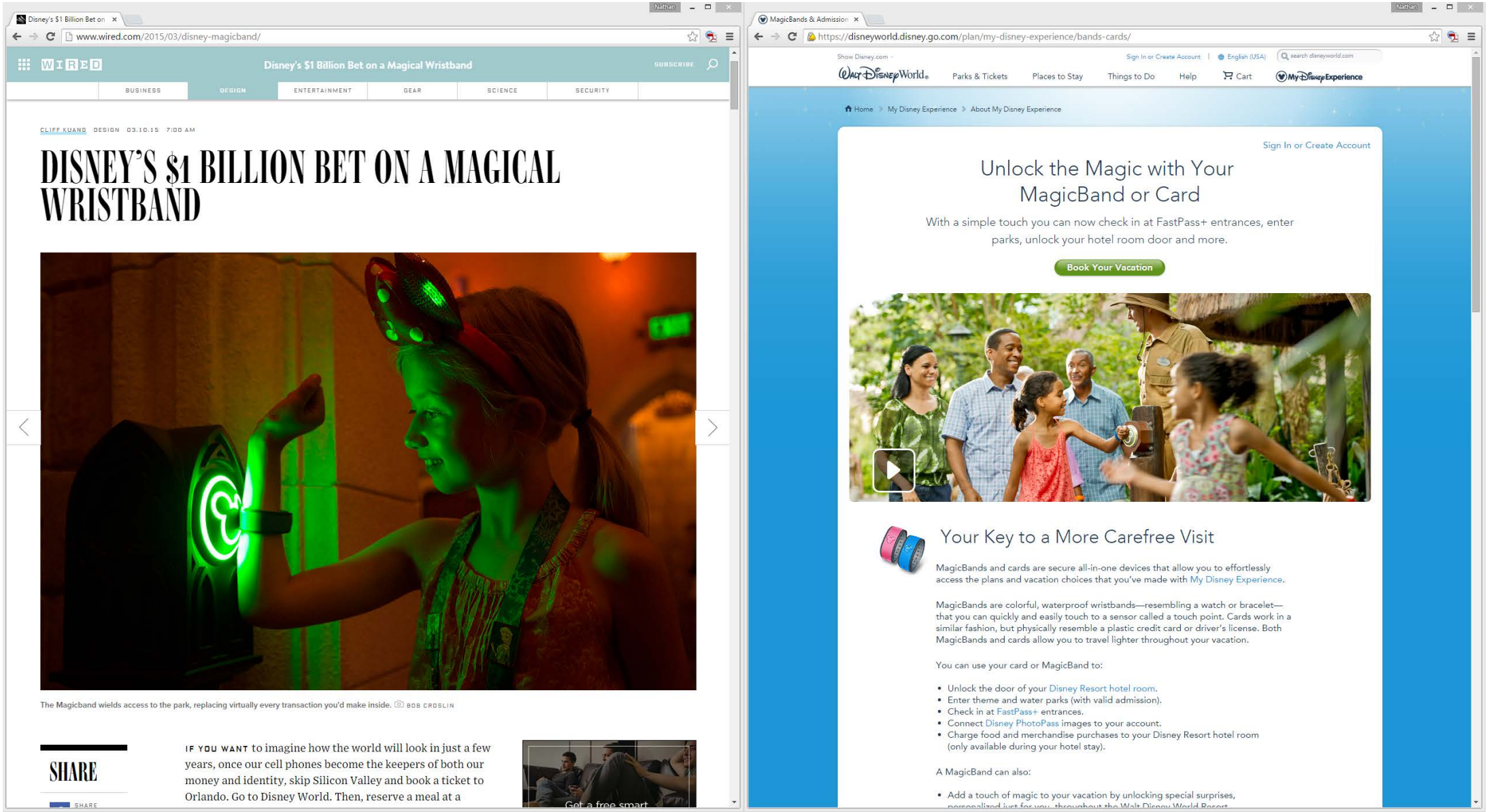
Course Description

This seminar will introduce and define the related concepts of Computational Design, Parametric Modeling, Algorithms, and Data Analysis in the context of architectural practice. Mastery of these technologies and approaches is becoming increasingly important for design practices to manage complexity, streamline processes, and gain insight. Examples drawn from practice will illustrate the application of computation to real-world projects, and introduce strategies for increasing adoption and application.

Learning Objectives

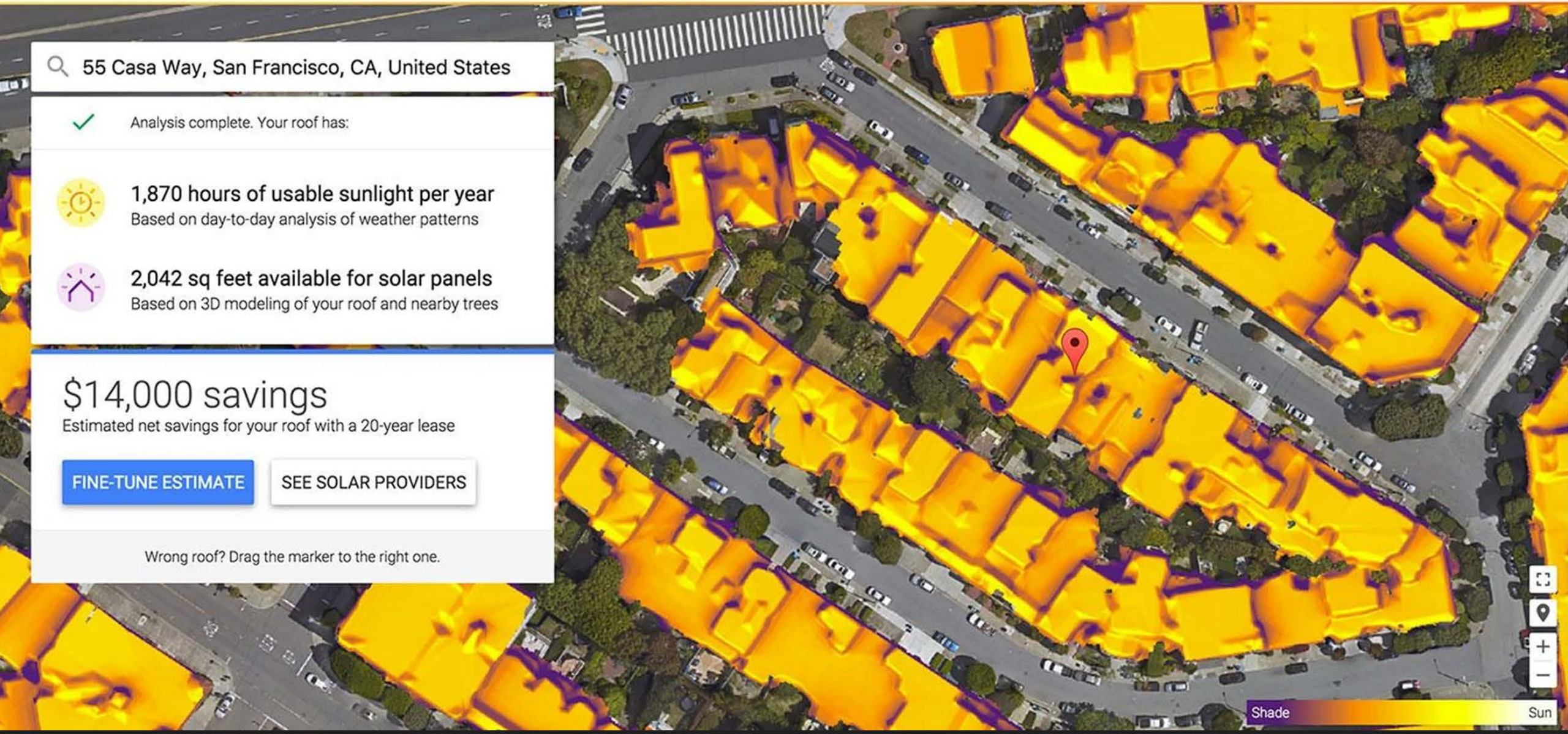
1. Describe the concepts of parametric design, data analysis, and design computation in general
2. Relate the concepts to areas of architectural practice
3. Seek opportunities within their own practices and projects to leverage such strategies
4. Assess the success of applied strategies in project work to better align them in the future

Our built world is becoming ‘datafied’.



Disney MagicBand– Enhance the park experience, control access, collect visitor data.

Google | Project Sunroof

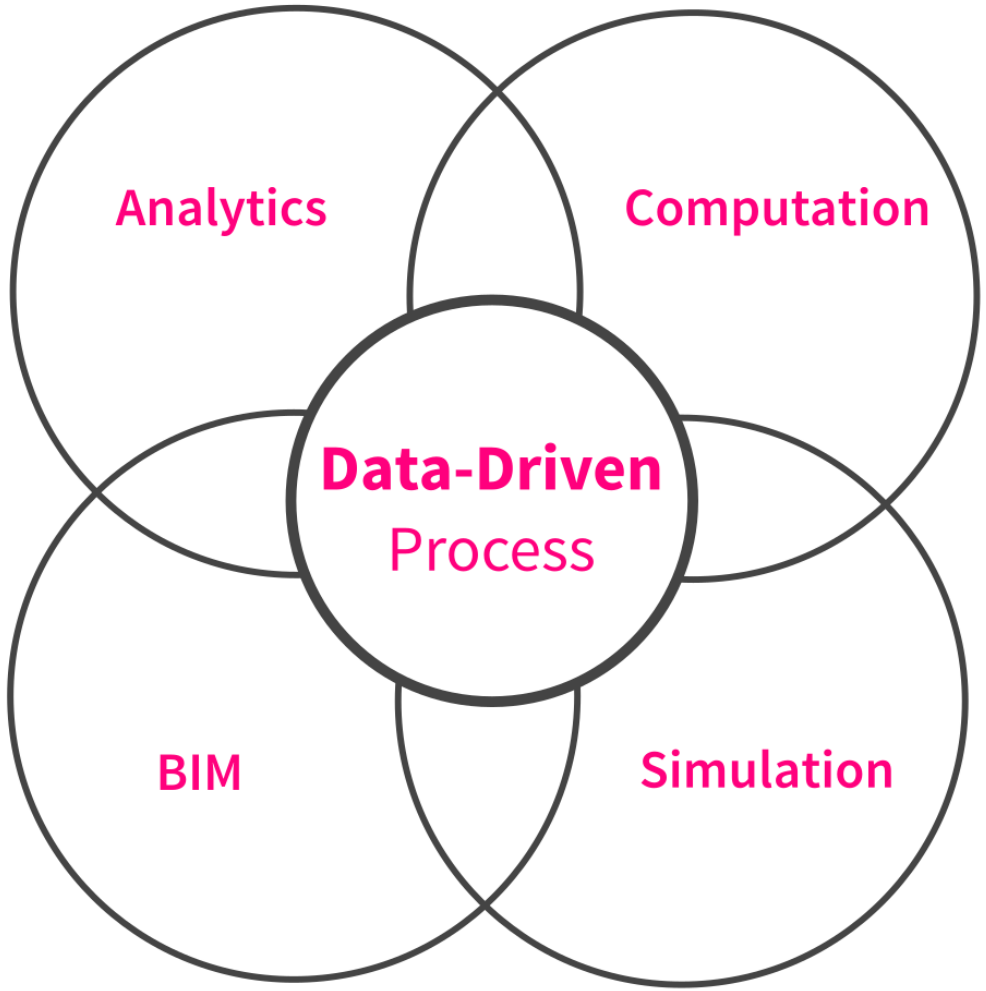


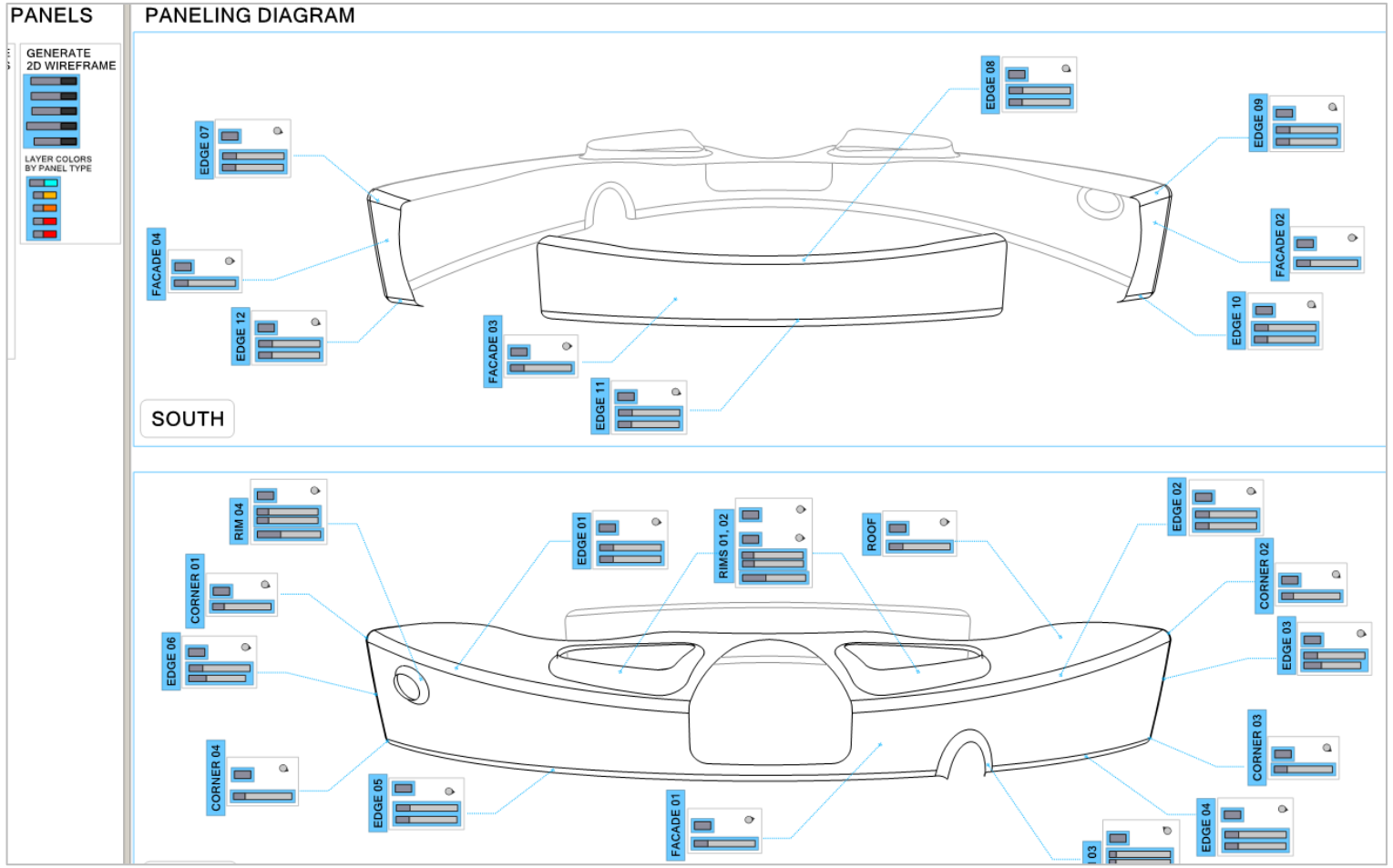
Project Sunroof, Google – Environmental analysis for home owners.

Nest *- A thermostat that learns and adapts to your behavior.*

Data has been described as the ‘new oil for the digital economy.’

What does a Data-Driven process look like?


Analytics
Computation
Data-Driven
Process
BIM
Simulation



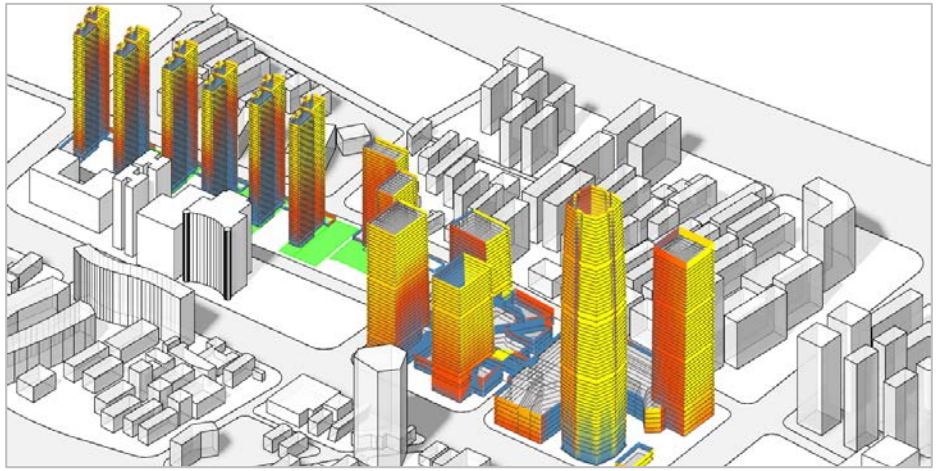
SOLAR ANALYSIS

	% Reduction from Louvers			*% Reduction from Louvers + Window*			*% Transmitted into Building*		
	-15	0	15	-15	0	15	-15	0	15
90	51.125438	51.736603	52.239696	80.4501752	80.6946412	80.8958784	19.5498248	19.3053588	19.104
80	47.350376	49.213684	52.485653	78.9401504	79.6854736	80.9942612	21.0598496	20.3145264	19.005
70	45.114407	48.460908	54.073191	78.0457628	79.3843632	81.6292764	21.9542372	20.6156368	18.370
60	43.131848	49.601252	57.129015	77.2527392	79.8405008	82.851606	22.7472608	20.1594992	17.148
50	43.739286	52.910487	62.476709	77.4957144	81.1641948	84.9906836	22.5042856	18.8358052	15.009
40	46.340464	57.207274	67.574719	78.5361856	82.8829096	87.0298876	21.4638144	17.1170904	12.970
30	48.639785	60.013416	70.932399	79.455914	84.0053664	88.3729596	20.544086	15.9946336	11.627
20	49.560259	61.861817	72.739808	79.8241036	84.7447268	89.0959232	20.1758964	15.2552732	10.904
10	49.828576	62.435716	73.220541	79.9314304	84.9742864	89.2882164	20.0685696	15.0257136	10.711
0	49.187598	61.619587	74.770813	79.6750392	84.6478348	89.9083252	20.3249608	15.3521652	10.091
10	49.0199	60.43825	71.457852	79.60796	84.1753	88.5831408	20.39204	15.8247	11.416
20	48.837296	58.634568	69.199523	79.5349184	83.4538272	87.6798092	20.4650816	16.5461728	12.320
30	48.591339	56.834613	65.856749	79.4365356	82.7338452	86.3426996	20.5634644	17.2661548	13.657
40	48.896922	55.153909	62.987255	79.5587688	82.0615636	85.194902	20.4412312	17.9384364	14.805
50	49.776403	54.12909	60.550048	79.9105612	81.651636	84.2200192	20.0894388	18.348364	15.779
60	49.906835	52.999925	58.068123	79.962734	81.19997	83.2272492	20.037266	18.80003	16.772
70	50.327942	51.952747	55.545204	80.1311768	80.7810988	82.2180816	19.8688232	19.2189012	17.781
80	51.17761	50.823582	53.145263	80.471044	80.3294328	81.2581052	19.528956	19.6705672	18.741
90	53.939033	52.291869	49.947827	81.5756132	80.9167476	79.9791308	18.4243868	19.0832524	20.020

Value Scale	
Min	50
Max	80

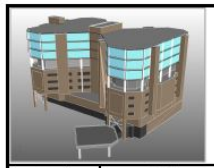
Value Scale	
Min	75
Max	95

Value Scale	
Less Than %	15



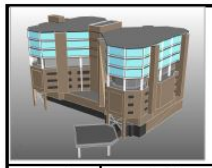
Early-stage parametric modeling, RTKL w/ CASE

FAÇADE DESIGN OPTIONS



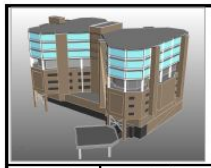
OPTION 1
90% GLAZED

Month	Cooling	Heating
Row Labels	Sum of Option-1: 0.9	Sum of Option-1: 0.92
January	14302.42755	70380000
February	261144.9827	46290000
March	3914000	20572000
April	20887000	9935000
May	41788000	960002.2467
June	65032000	124617.346
July	80392000	19069.95937
August	61428000	73830.33145
September	42858000	605067.6452
October	13996000	4976700
November	3146200	28516000
December	0	65052000
Grand Total	333716647.4	247504287.5



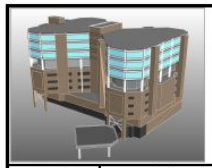
OPTION 2
80% GLAZED

Month	Cooling	Heating
Row Labels	Sum of Option-2: 0.8	Sum of Option-2: 0.82
January	5940.065366	66206000
February	207769.2414	43445000
March	3365100	18987000
April	19080000	9086200
May	38578000	863960.3275
June	60674000	114910.0901
July	75259000	16590.18893
August	57139000	66900.56944
September	40116000	532000.005
October	12826000	4474100
November	2966000	26591000
December	0	61022000
Grand Total	310616809.3	231405661.2



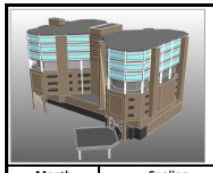
OPTION 3
70% GLAZED

Month	Cooling	Heating
Row Labels	Sum of Option-3: 0.7	Sum of Option-3: 0.72
January	1832.201459	61923000
February	166324.435	40682000
March	2824000	17520000
April	17229000	8265000
May	35191000	768508.4998
June	56035000	105260.8052
July	69846000	14204.05635
August	53389000	59002.69845
September	37171000	460795.8028
October	11605000	3994300
November	2773600	24626000
December	0	56886000
Grand Total	286231756.6	215304071.9



OPTION 4
60% GLAZED

Month	Cooling	Heating
Row Labels	Sum of Option-4: 0.6	Sum of Option-4: 0.62
January	0	57519000
February	125419.2812	37811000
March	2346300	16123000
April	15360000	7488700
May	31768000	685951.9093
June	51278000	97636.17854
July	64232000	12015.82116
August	49112000	50464.26261
September	34147000	397835.7777
October	10413000	3533800
November	2589600	22682000
December	0	52735000
Grand Total	261371319.3	199136403.9



OPTION 5
50% GLAZED

Month	Cooling	Heating
Row Labels	Sum of Option-5: 0.5	Sum of Option-5: 0.52
January	0	53153000
February	86057.25042	34994000
March	1942600	14726000
April	13552000	6717900
May	28340000	616994.4296
June	46440000	88264.39767
July	58510000	9829.916105
August	44793000	45409.1547
September	31150000	340874.0995
October	9257900	3088200
November	2411600	20699000
December	0	48542000
Grand Total	236483157.3	183021472

OPTION 6
40% GLAZED

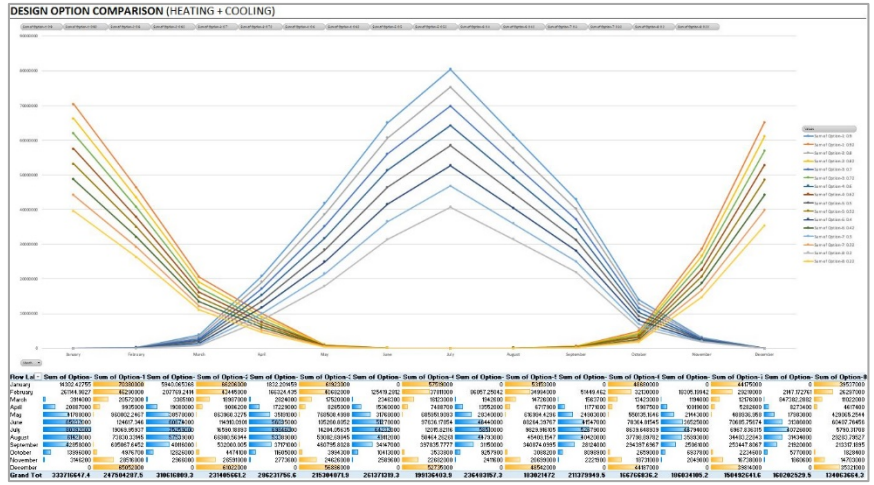
Month	Cooling	Heating
Row Labels	Sum of Option-6: 0.4	Sum of Option-6: 0.42
January	0	48680000
February	51449.462	32130000
March	1563700	13423000
April	11771000	5987500
May	24903000	550135.1646
June	41547000	78364.81545
July	52679000	8639.648939
August	40420000	37798.89782
September	28124000	294397.6967
October	8098900	2659000
November	2221900	18731000
December	0	44187000
Grand Total	211379949.5	166766836.2

OPTION 7
30% GLAZED

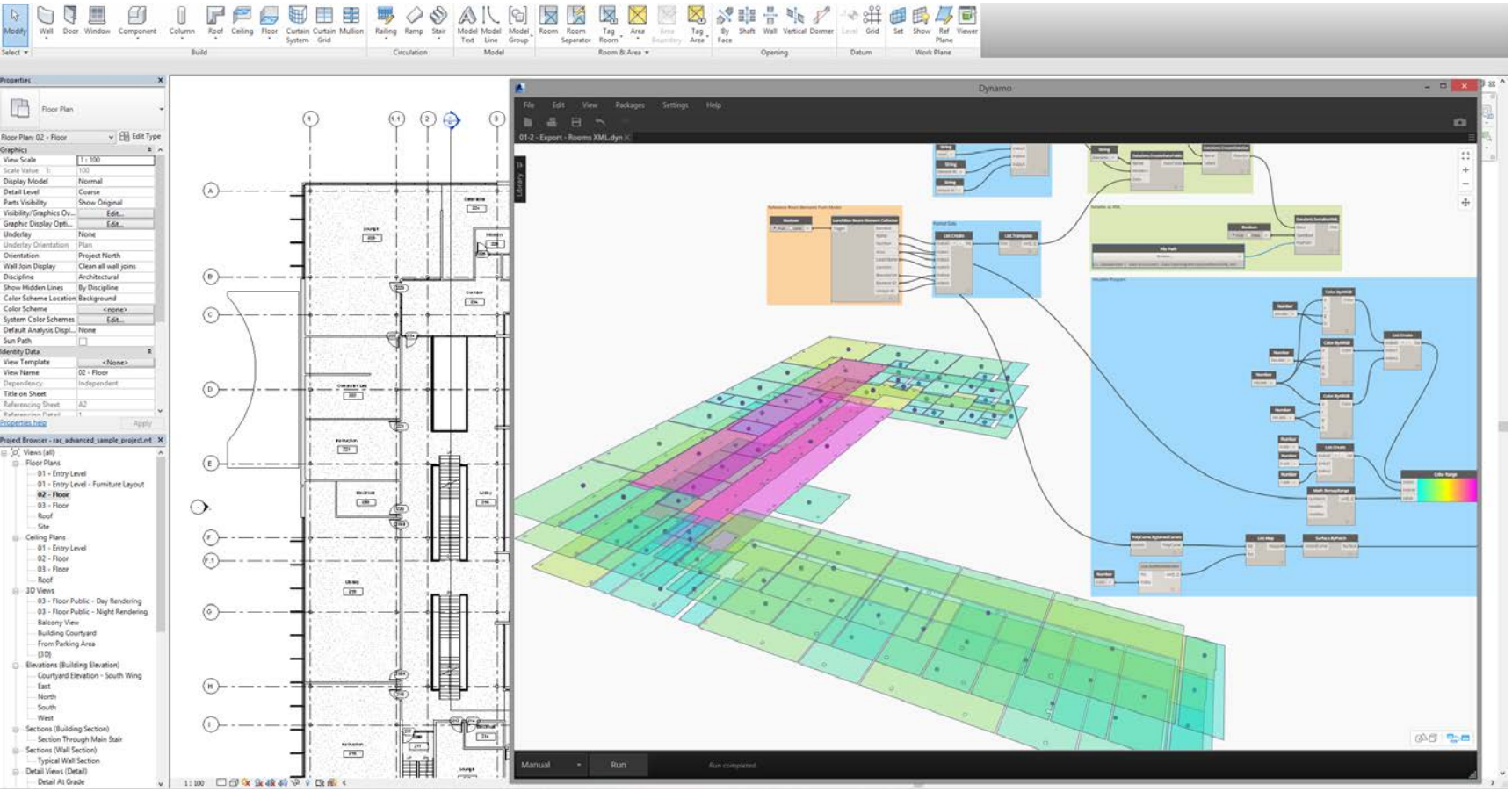
Month	Cooling	Heating
Row Labels	Sum of Option-7: 0.3	Sum of Option-7: 0.32
January	0	44175000
February	18305.19942	29218000
March	1194000	12176000
April	10019000	5282600
May	21443000	488936.958
June	36525000	70685.75674
July	46794000	6967.836315
August	35993000	34403.22843
September	25061000	253447.8067
October	6937800	2234600
November	2049000	16738000
December	0	39814000
Grand Total	186034105.2	150492641.6

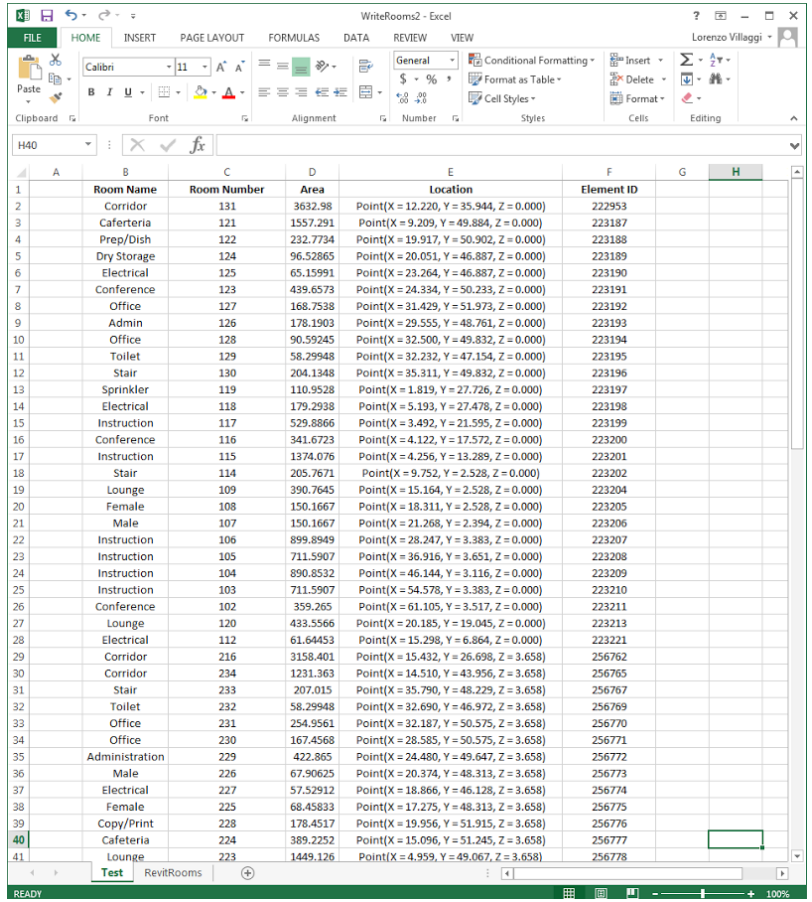
OPTION 8
20% GLAZED

Month	Cooling	Heating
Row Labels	Sum of Option-8: 0.2	Sum of Option-8: 0.22
January	0	39537000
February	2147.172761	26297000
March	847382.2882	11022000
April	8273400	4617400
May	17983000	429065.2544
June	31386000	60407.76456
July	40726000	5790.31708
August	31434000	29283.79527
September	21920000	213317.1895
October	5770000	1828400
November	1860600	14703000
December	0	35321000
Grand Total	160202529.5	134063664.3



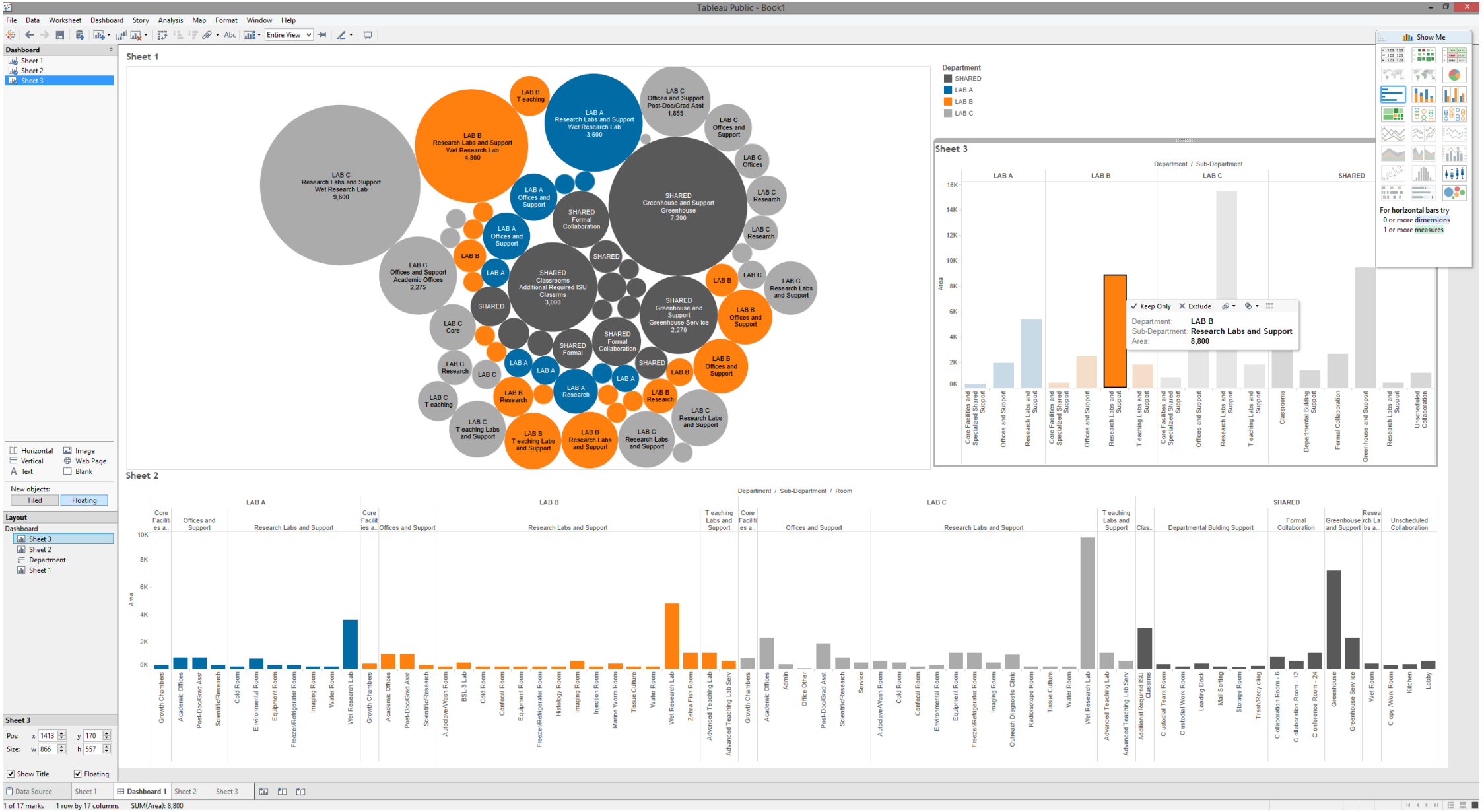
Early-stage energy analysis, HDR Architecture w/ Proving Ground





Room Name	Room Number	Area	Location	Element ID
Corridor	131	3632.98	Point(X = 12.220, Y = 35.944, Z = 0.000)	222953
Caferteria	121	1557.291	Point(X = 9.209, Y = 49.884, Z = 0.000)	223187
Prep/Dish	122	232.7734	Point(X = 19.917, Y = 50.902, Z = 0.000)	223188
Dry Storage	124	96.52865	Point(X = 20.051, Y = 46.887, Z = 0.000)	223189
Electrical	125	65.15991	Point(X = 23.264, Y = 46.887, Z = 0.000)	223190
Conference	123	439.6573	Point(X = 24.334, Y = 50.233, Z = 0.000)	223191
Office	127	168.7538	Point(X = 31.429, Y = 51.973, Z = 0.000)	223192
Admin	126	178.1903	Point(X = 29.555, Y = 48.761, Z = 0.000)	223193
Office	128	90.59245	Point(X = 32.500, Y = 49.832, Z = 0.000)	223194
Toilet	129	58.29948	Point(X = 32.232, Y = 47.154, Z = 0.000)	223195
Stair	130	204.1348	Point(X = 35.311, Y = 49.832, Z = 0.000)	223196
Sprinkler	119	110.9528	Point(X = 1.819, Y = 27.726, Z = 0.000)	223197
Electrical	118	179.2938	Point(X = 5.193, Y = 27.478, Z = 0.000)	223198
Instruction	117	529.8866	Point(X = 3.492, Y = 21.595, Z = 0.000)	223199
Conference	116	341.6723	Point(X = 4.122, Y = 17.572, Z = 0.000)	223200
Instruction	115	1374.076	Point(X = 4.256, Y = 13.289, Z = 0.000)	223201
Stair	114	205.7671	Point(X = 9.752, Y = 2.528, Z = 0.000)	223202
Lounge	109	390.7645	Point(X = 15.164, Y = 2.528, Z = 0.000)	223204
Female	108	150.1667	Point(X = 18.311, Y = 2.528, Z = 0.000)	223205
Male	107	150.1667	Point(X = 21.268, Y = 2.394, Z = 0.000)	223206
Instruction	106	899.8949	Point(X = 28.247, Y = 3.383, Z = 0.000)	223207
Instruction	105	711.5907	Point(X = 36.916, Y = 3.651, Z = 0.000)	223208
Instruction	104	890.8532	Point(X = 46.144, Y = 3.116, Z = 0.000)	223209
Instruction	103	711.5907	Point(X = 54.578, Y = 3.383, Z = 0.000)	223210
Conference	102	359.265	Point(X = 61.105, Y = 3.517, Z = 0.000)	223211
Lounge	120	433.5566	Point(X = 20.185, Y = 19.045, Z = 0.000)	223213
Electrical	112	61.64453	Point(X = 15.298, Y = 6.864, Z = 0.000)	223221
Corridor	216	3158.401	Point(X = 15.432, Y = 26.698, Z = 3.658)	256762
Corridor	234	1231.363	Point(X = 14.510, Y = 43.956, Z = 3.658)	256765
Stair	233	207.015	Point(X = 35.790, Y = 48.229, Z = 3.658)	256767
Toilet	232	58.29948	Point(X = 32.690, Y = 46.972, Z = 3.658)	256769
Office	231	254.9561	Point(X = 32.187, Y = 50.575, Z = 3.658)	256770
Office	230	167.4568	Point(X = 28.585, Y = 50.575, Z = 3.658)	256771
Administration	229	422.865	Point(X = 24.480, Y = 49.647, Z = 3.658)	256772
Male	226	67.90625	Point(X = 20.374, Y = 48.313, Z = 3.658)	256773
Electrical	227	57.52912	Point(X = 18.866, Y = 46.128, Z = 3.658)	256774
Female	225	68.45833	Point(X = 17.275, Y = 48.313, Z = 3.658)	256775
Copy/Print	228	178.4517	Point(X = 19.956, Y = 51.915, Z = 3.658)	256776
Cafeteria	224	389.2252	Point(X = 15.096, Y = 51.245, Z = 3.658)	256777
Lounge	223	1449.126	Point(X = 4.959, Y = 49.067, Z = 3.658)	256778

Interoperability and Data Mining workflow with BIM, Proving Ground

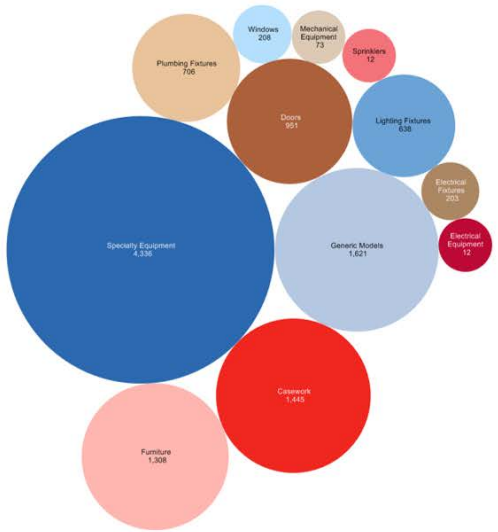


Space and Program Analytics, Proving Ground

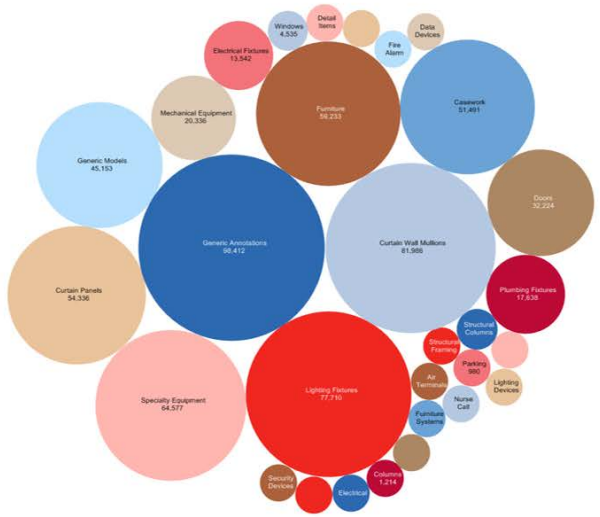
How can architects implement a data-driven strategy?

Choose the right data sources for your business.

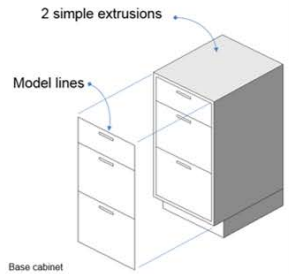
+20,500 Families



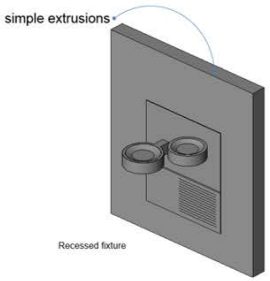
+645,000 Instances



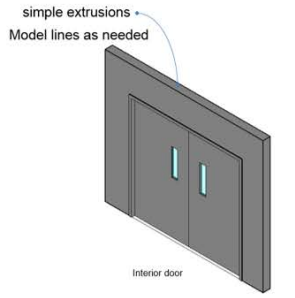
Construction	
Hosting	Not hosted
Nesting	Not needed
Cut behavior	Built-in
Subcategories	Define at project level
Geometry	
2D	Use model lines on 3D workplane
3D	Simple solids, extrusions preferred
Clearances	Not needed
Information	
Classification	Assembly code level 3. Lower levels defined per project
Identification	NBBJ_TypeMark used
Materials	Driven by material parameter
Performance	Not used
Keynotes	NBBJ Master Keynote file used
Types	As needed per project



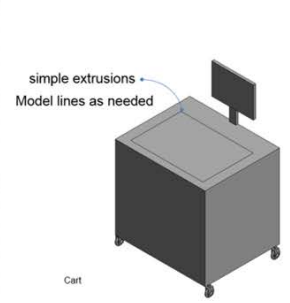
Construction	
Hosting	Face based
Nesting	Detail components only
Cut behavior	Built-in
Subcategories	'Clearance' subcategory used. Other to be defined at project level, as needed
Geometry	
2D	Use detail components for planometric views, if needed
3D	Simple solids
Clearances	3D solid (in 'Clearance' subcategory) is used to demonstrate full range of motion / access / clearance as needed
Information	
Classification	Assembly code level 3. Lower levels defined per project
Identification	NBBJ_TypeMark used
Materials	Driven by material parameter
Performance	Define at project level for analysis
Keynotes	Masterformat keynote used
Types	Variation managed through new families



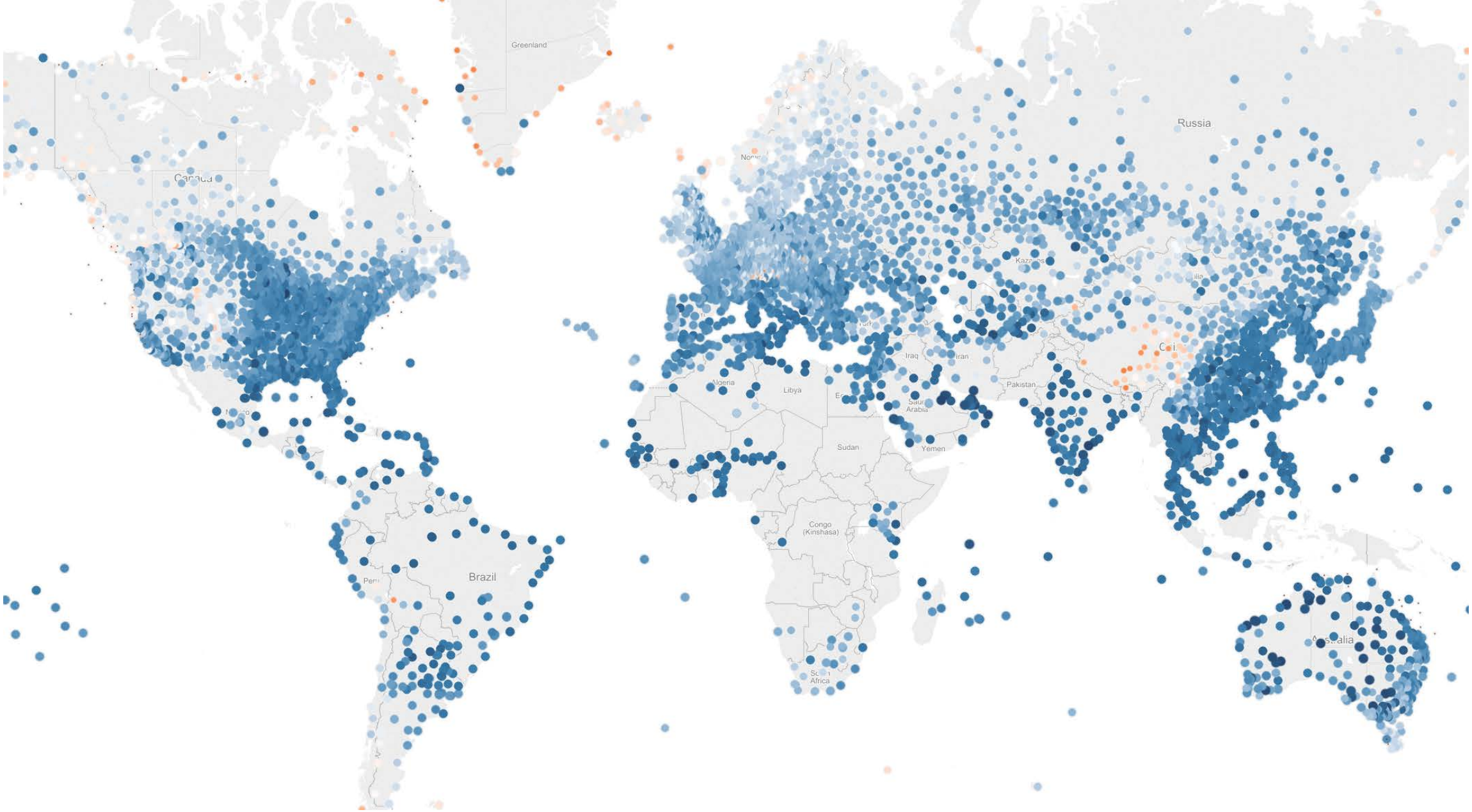
Construction	
Hosting	Wall hosted (default)
Nesting	Can use nesting for frames, panels and detail components
Cut behavior	Built-in
Subcategories	Define at project level
Geometry	
2D	Use model lines on Symbolic lines for projection and plan view. Use detail components to add further detail to cut views
3D	Simple solids
Clearances	Dashed lines in plan show opening
Information	
Classification	Assembly code level 3. Lower levels defined per project
Identification	NBBJ_TypeMark used
Materials	Driven by material parameter
Performance	Not used
Keynotes	NBBJ Master Keynote file used
Types	As needed per project



Construction	
Hosting	Not hosted
Nesting	Detail components only
Cut behavior	Built-in
Subcategories	'Clearance' subcategory used. Other to be defined at project level
Geometry	
2D	Use detail components for planometric views
3D	Simple solids
Clearances	3D solid (in 'Clearance' subcategory) is used to demonstrate full range of motion / access / clearance as needed
Information	
Classification	Not used
Identification	NBBJ_TypeMark used
Materials	Driven by material parameter
Performance	Not used
Keynotes	Not used
Types	As needed per project



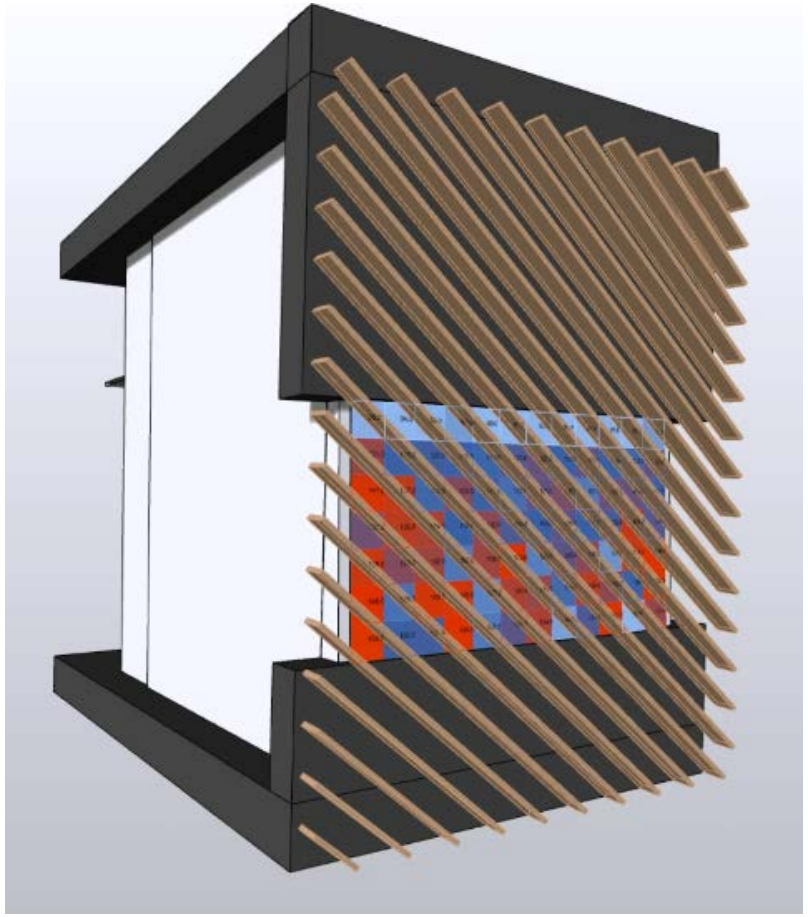
Content Analysis and Standardization , NBBJ w/ CASE



ASHRAE Weather Station Data Visualization, Proving Ground

Focus on tangible outcomes.

Louver Optimization, SNØHETTA w/ CASE



Louver Angle

Louver Rotation

	% Reduction from Louvers		
	-15	0	15
-90	51.125438	51.736603	52.239696
-80	47.350376	49.213684	52.485653
-70	45.114407	48.460908	54.073191
-60	43.131848	49.601252	57.129015
-50	43.739286	52.910487	62.476709
-40	46.340464	57.207274	67.574719
-30	48.639785	60.013416	70.932399
-20	49.560259	61.861817	72.739808
-10	49.828576	62.435716	73.220541
0	49.187598	61.619587	74.770813
10	49.0199	60.43825	71.457852
20	48.837296	58.634568	69.199523
30	48.591339	56.834613	65.856749
40	48.896922	55.153909	62.987255
50	49.776403	54.12909	60.550048
60	49.906835	52.999925	58.068123
70	50.327942	51.952747	55.545204
80	51.17761	50.823582	53.145263
90	53.939033	52.291869	49.947827

SOLAR ANALYSIS

	% Reduction from Louvers			% Reduction from Louvers + Window			% Transmitted into Building		
	-15	0	15	-15	0	15	-15	0	15
-90	51.125438	51.736603	52.239696	80.4501752	80.6946412	80.8958784	19.5498248	19.3053588	19.1041216
-80	47.350376	49.213684	52.485653	78.9401504	79.6854736	80.9942612	21.0598496	20.3145264	19.0057388
-70	45.114407	48.460908	54.073191	78.0457628	79.3843632	81.6292764	21.9542372	20.6156368	18.3707236
-60	43.131848	49.601252	57.129015	77.2527392	79.8405008	82.851606	22.7472608	20.1594992	17.148394
-50	43.739286	52.910487	62.476709	77.4957144	81.1641948	84.9906836	22.5042856	18.8358052	15.0093164
-40	46.340464	57.207274	67.574719	78.5361856	82.8829096	87.0298876	21.4638144	17.1170904	12.9701124
-30	48.639785	60.013416	70.932399	79.455914	84.0053664	88.3729596	20.544086	15.9946336	11.6270404
-20	49.560259	61.861817	72.739808	79.8241036	84.7447268	89.0959232	20.1758964	15.2552732	10.9040768
-10	49.828576	62.435716	73.220541	79.9314304	84.9742864	89.2882164	20.0685696	15.0257136	10.7117836
0	49.187598	61.619587	74.770813	79.6750392	84.6478348	89.9083252	20.3249608	15.3521652	10.0916748
10	49.0199	60.43825	71.457852	79.60796	84.1753	88.5831408	20.39204	15.8247	11.4168592
20	48.837296	58.634568	69.199523	79.5349184	83.4538272	87.6798092	20.4650816	16.5461728	12.3201908
30	48.591339	56.834613	65.856749	79.4365356	82.7338452	86.3426996	20.5634644	17.2661548	13.6573004
40	48.896922	55.153909	62.987255	79.5587688	82.0615636	85.194902	20.4412312	17.9384364	14.805098
50	49.776403	54.12909	60.550048	79.9105612	81.651636	84.2200192	20.0894388	18.348364	15.7799808
60	49.906835	52.999925	58.068123	79.962734	81.19997	83.2272492	20.037266	18.80003	16.7727508
70	50.327942	51.952747	55.545204	80.1311768	80.7810988	82.2180816	19.8688232	19.2189012	17.7819184
80	51.17761	50.823582	53.145263	80.471044	80.3294328	81.2581052	19.528956	19.6705672	18.7418948
90	53.939033	52.291869	49.947827	81.5756132	80.9167476	79.9791308	18.4243868	19.0832524	20.0208692

Value Scale	
Min	50
Max	80

Value Scale	
Min	75
Max	95

Value Scale	
Less Than %	15

SOLAR ANALYSIS

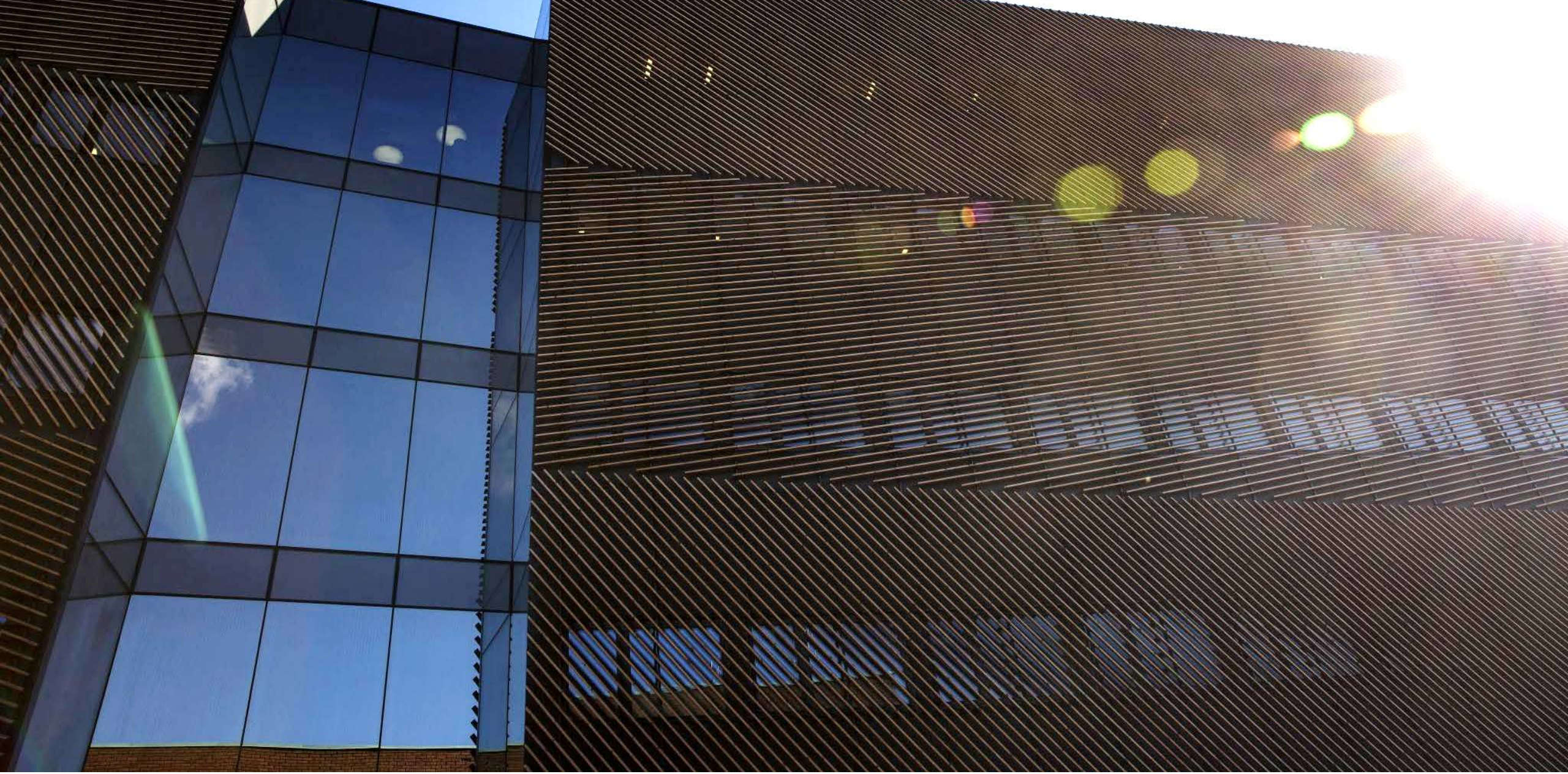
	% Reduction from Louvers			% Reduction from Louvers + Window			% Transmitted into Building		
	-15	0	-15	-15	0	-15	-15	0	-15
-90	51.430823	56.553898	61.719413	80.5723292	82.6215592	84.6877652	19.4276708	17.3784408	15.3122348
-80	52.898024	58.43337	63.61101	81.1592096	83.373348	85.444404	18.8407904	16.626652	14.555596
-70	54.068146	59.482236	65.175215	81.6272584	83.7928844	86.070286	18.3727416	16.2071056	13.929914
-60	53.965078	60.44016	66.521159	81.5860312	84.176064	86.6084636	18.4139688	15.823936	13.3915364
-50	53.613435	60.561416	67.503335	81.445374	84.2245664	87.001334	18.554626	15.7754336	12.998666
-40	52.400873	60.227962	68.109616	80.9603492	84.0911848	87.2438464	19.0396508	15.9088152	12.7561536
-30	51.176185	59.670183	68.418819	80.470474	83.8680732	87.3675276	19.529526	16.1319268	12.6324724
-20	48.411544	58.645568	68.849279	79.3646176	83.4582272	87.5397116	20.6353824	16.5417728	12.4602884
-10	45.064872	56.632715	68.036862	78.0259488	82.653086	87.2147448	21.9740512	17.346914	12.7852552
0	39.12938	52.952589	67.570025	75.651752	81.1810356	87.02801	24.348248	18.8189644	12.97199
10	39.784164	50.436522	62.804656	75.9136656	80.1746088	85.1218624	24.0863344	19.8253912	14.8781376
20	37.928944	46.853401	58.578877	75.1715776	78.7413604	83.4315508	24.8284224	21.2586396	16.5684492
30	36.449618	42.433612	52.837395	74.5798472	76.9734448	81.134958	25.4201528	23.0265552	18.865042
40	38.886868	39.778101	47.774948	75.5547472	75.9112404	79.1099792	24.4452528	24.0887596	20.8900208
50	44.634413	41.687887	44.385837	77.8537652	76.6751548	77.7543348	22.1462348	23.3248452	22.2456652
60	50.630532	46.519947	45.568085	80.2522128	78.6079788	78.227234	19.7477872	21.3920212	21.772766
70	54.947254	50.509276	48.247848	81.9789016	80.2037104	79.2991392	18.0210984	19.7962896	20.7008608
80	58.803201	54.492543	50.491088	83.5212804	81.7970172	80.1964352	16.4787196	18.2029828	19.8035648
90	61.137383	56.305323	49.95756	84.4549532	82.5221292	79.983024	15.5450468	17.4778708	20.016976

Value Scale	
Min	50
Max	80

Value Scale	
Min	75
Max	95

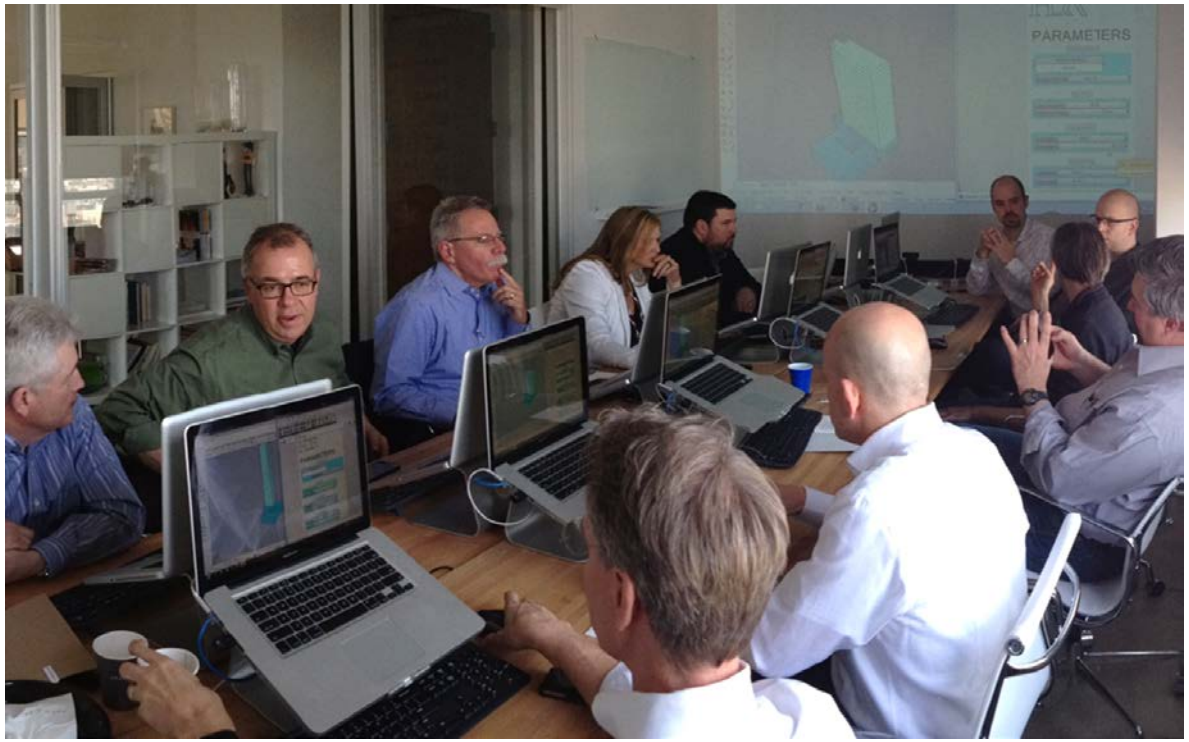
Value Scale	
Less Than %	15

Louver Optimization, SNØHETTA w/ CASE



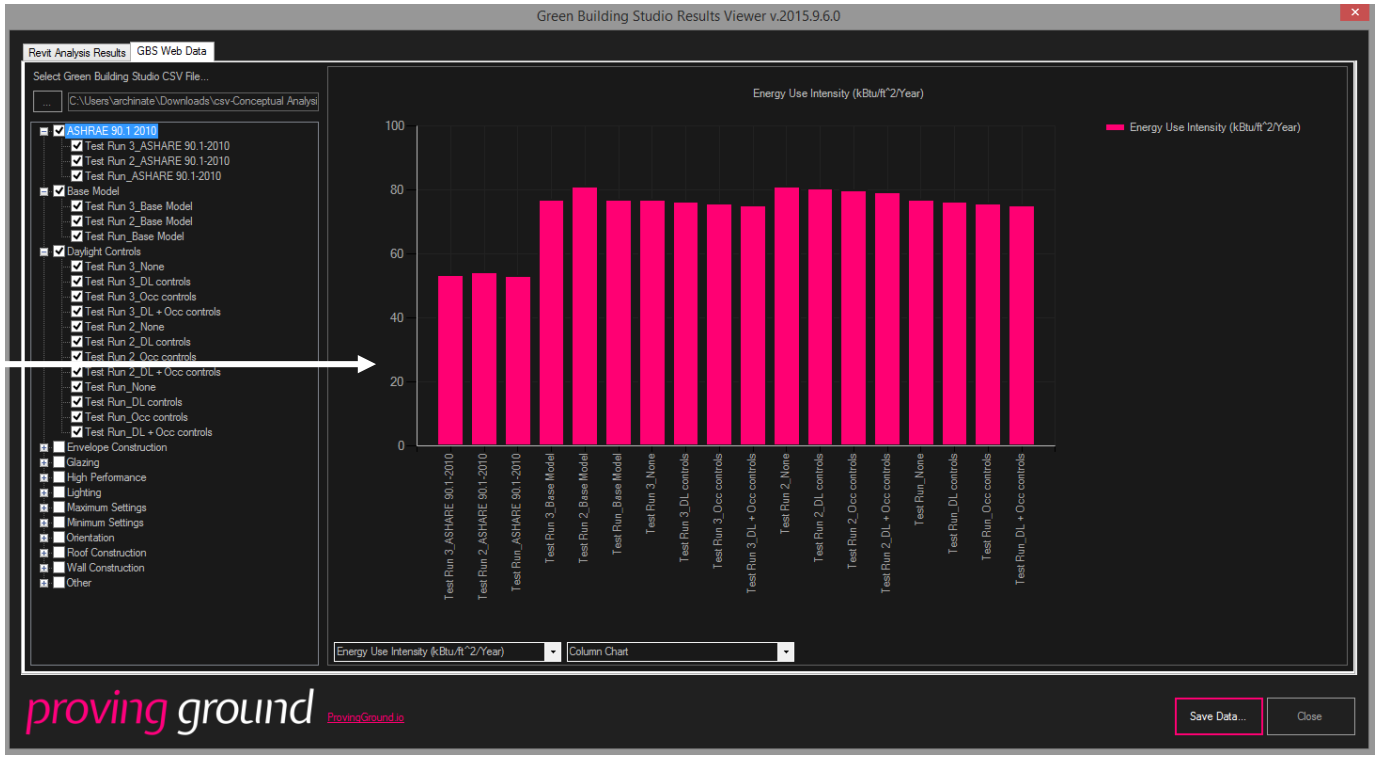
Louver Optimization, SNØHETTA w/ CASE

Build up your front lines.

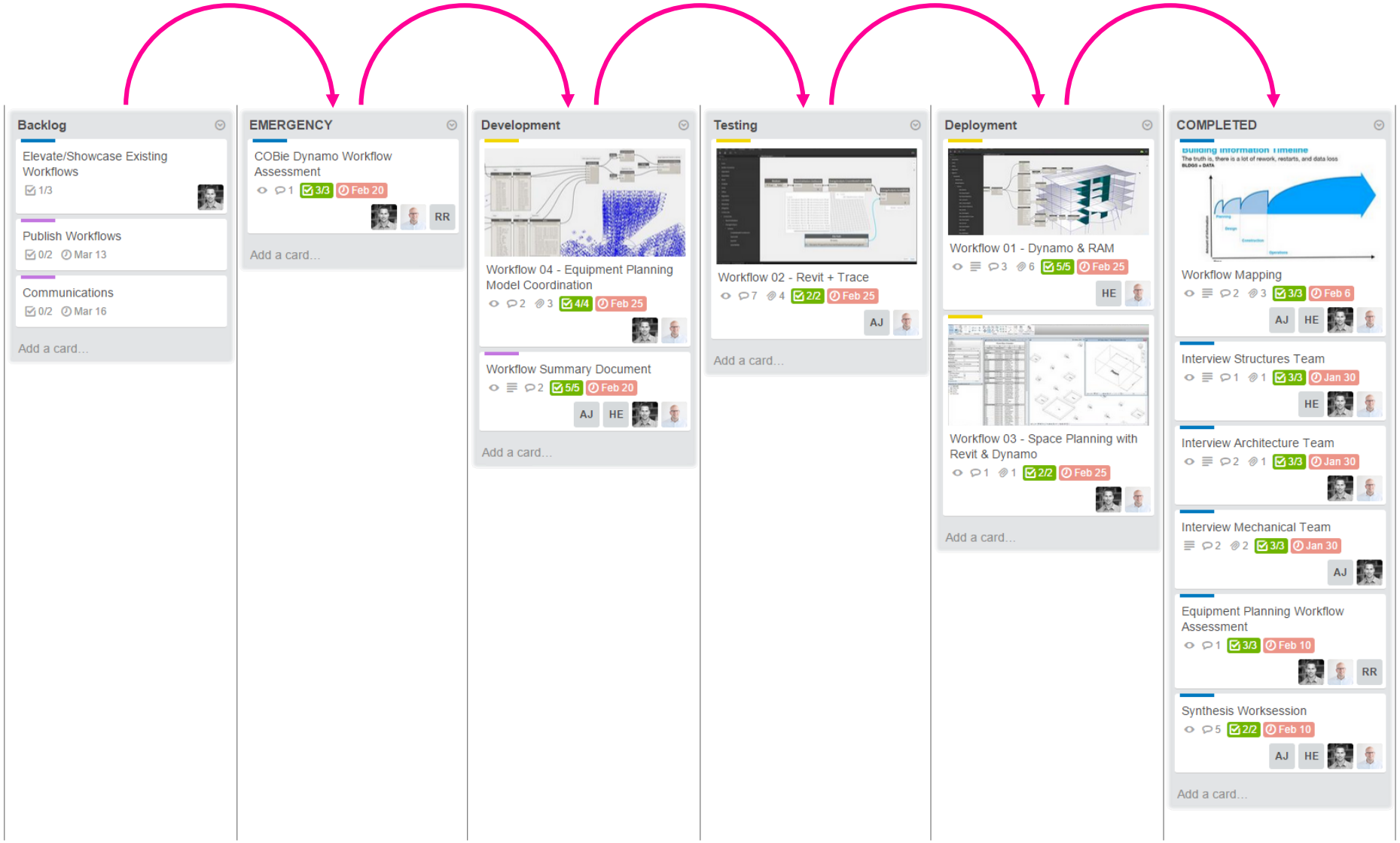


Workshops for Leadership & Staff, *HDR Architecture*

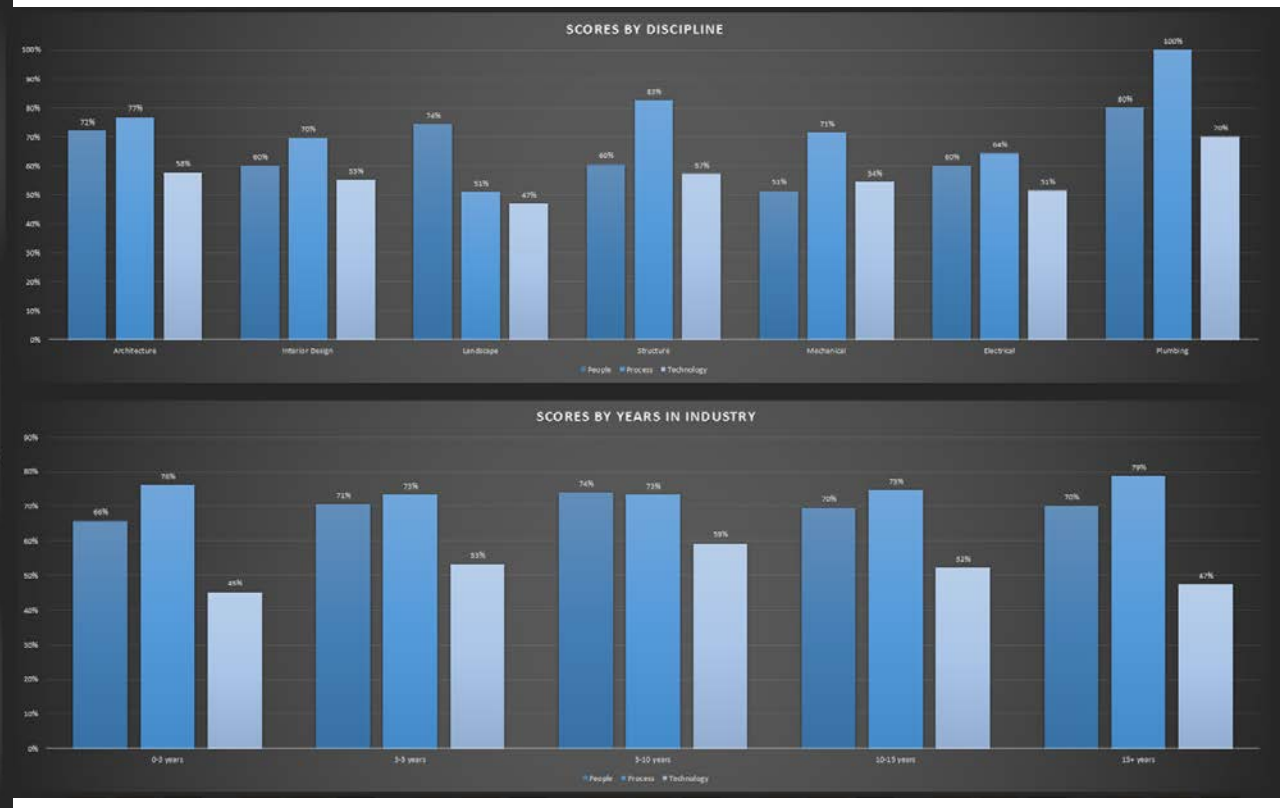
RunID	AltRunID	DateAdde	Username	Title	StatusID	BuildingTy	FloorArea	AnnualEle	AnnualFue	AnnualEle	AnnualEle	AnnualFue	EnergyUse	Notes	SIResults	Classificat
558837	12400475	8/5/2015...	nate@pr...	Test Run...	4	Office	12213.92	20598.51...	1926.925...	47.696	143343.9	166.5345	53.67841...		False	ASHRAE
558836	12400408	8/5/2015...	nate@pr...	Test Run...	4	Office	12856.66	22637.69...	1900.049...	51.818	157534.4	164.2117	54.58019...		False	ASHRAE
558835	12400341	8/5/2015...	nate@pr...	Test Run...	4	Office	13029	22436.42...	1875.246...	49.87	156133.8	162.0681	53.32693...		False	ASHRAE
558837	12400485	8/5/2015...	nate@pr...	Test Run...	4	Office	12213.92	22329.74...	4776.546...	47.244	155391.4	412.8128	77.20766...		False	Base Model
558836	12400418	8/5/2015...	nate@pr...	Test Run...	4	Office	12856.66	25028.53...	5220.038...	52.253	174172.1	451.1416	81.31324...		False	Base Model
558835	12400351	8/5/2015...	nate@pr...	Test Run...	4	Office	13029	24474.97...	4882.521...	50.167	170319.9	421.9717	76.99003...		False	Base Model
558837	12400504	8/5/2015...	nate@pr...	Test Run...	4	Office	12213.92	22329.74...	4776.546...	47.244	155391.4	412.8128	77.20766...		False	Daylight ...
558837	12400505	8/5/2015...	nate@pr...	Test Run...	4	Office	12213.92	21569.31...	4866.891...	45.841	150099.6	420.6209	76.36866...		False	Daylight ...
558837	12400506	8/5/2015...	nate@pr...	Test Run...	4	Office	12213.92	21269.89...	4888.797...	45.356	148016	422.5141	75.94160...		False	Daylight ...
558837	12400507	8/5/2015...	nate@pr...	Test Run...	4	Office	12213.92	20639.73...	4956.793...	44.164	143630.7	428.3907	75.19769...		False	Daylight ...
558836	12400437	8/5/2015...	nate@pr...	Test Run...	4	Office	12856.66	25028.53...	5220.038...	52.253	174172.1	451.1416	81.31324...		False	Daylight ...
558836	12400438	8/5/2015...	nate@pr...	Test Run...	4	Office	12856.66	24337.76...	5303.231...	50.932	169365.1	458.3316	80.59677...		False	Daylight ...
558836	12400439	8/5/2015...	nate@pr...	Test Run...	4	Office	12856.66	23924.44...	5335.952...	50.274	166488.8	461.1595	80.05339...		False	Daylight ...
558836	12400440	8/5/2015...	nate@pr...	Test Run...	4	Office	12856.66	23331.49...	5405.620...	49.148	162362.5	467.1805	79.42664...		False	Daylight ...
558835	12400370	8/5/2015...	nate@pr...	Test Run...	4	Office	13029	24474.97...	4882.521...	50.167	170319.9	421.9717	76.99003...		False	Daylight ...
558835	12400371	8/5/2015...	nate@pr...	Test Run...	4	Office	13029	23808.21...	4969.150...	48.92	165680	429.4586	76.34958...		False	Daylight ...
558835	12400372	8/5/2015...	nate@pr...	Test Run...	4	Office	13029	23373.22...	5004.547...	48.209	162652.9	432.5178	75.79165...		False	Daylight ...
558835	12400373	8/5/2015...	nate@pr...	Test Run...	4	Office	13029	22793.76...	5086.035...	47.149	158620.5	439.5604	75.27619...		False	Daylight ...
558837	12400522	8/5/2015...	nate@pr...	Test Run...	4	Office	12213.92	22156.71...	4431.263...	47.132	154187.3	382.9718	74.42810...		False	Envelope...
558837	12400523	8/5/2015...	nate@pr...	Test Run...	4	Office	12213.92	22329.74...	4776.546...	47.244	155391.4	412.8128	77.20766...		False	Envelope...
558837	12400524	8/5/2015...	nate@pr...	Test Run...	4	Office	12213.92	22579.16...	5373.496...	47.451	157127.1	464.4042	81.91652...		False	Envelope...
558837	12400525	8/5/2015...	nate@pr...	Test Run...	4	Office	12213.92	22800.36...	5953.574...	47.649	158666.4	514.5374	86.45112...		False	Envelope...
558837	12400526	8/5/2015...	nate@pr...	Test Run...	4	Office	12213.92	23256.68...	6622.937...	48.121	161841.9	572.3871	92.07458...		False	Envelope...
558837	12400527	8/5/2015...	nate@pr...	Test Run...	4	Office	12213.92	23922.08...	7373.025...	48.862	166472.4	637.2134	98.67571...		False	Envelope...
558836	12400455	8/5/2015...	nate@pr...	Test Run...	4	Office	12856.66	24845.87...	4912.801...	52.195	172901	424.5887	78.91061...		False	Envelope...
558836	12400456	8/5/2015...	nate@pr...	Test Run...	4	Office	12856.66	25028.53...	5220.038...	52.253	174172.1	451.1416	81.31324...		False	Envelope...
558836	12400457	8/5/2015...	nate@pr...	Test Run...	4	Office	12856.66	25273.75...	5749.770...	52.355	175878.6	496.9237	85.32709...		False	Envelope...
558836	12400458	8/5/2015...	nate@pr...	Test Run...	4	Office	12856.66	25488.27...	6269.666...	52.476	177371.4	541.8557	89.21811...		False	Envelope...
558836	12400459	8/5/2015...	nate@pr...	Test Run...	4	Office	12856.66	25876.86...	6868.095...	52.87	180075.6	593.5749	93.95852...		False	Envelope...
558836	12400460	8/5/2015...	nate@pr...	Test Run...	4	Office	12856.66	26287.31...	7463.530...	53.331	182931.9	645.0353	98.71918...		False	Envelope...
558835	12400388	8/5/2015...	nate@pr...	Test Run...	4	Office	13029	24336.25...	4567.877...	50.072	169354.6	394.7786	74.65012...		False	Envelope...
558835	12400389	8/5/2015...	nate@pr...	Test Run...	4	Office	13029	24474.97...	4882.521...	50.167	170319.9	421.9717	76.99003...		False	Envelope...
558835	12400390	8/5/2015...	nate@pr...	Test Run...	4	Office	13029	24724.31...	5444.291...	50.453	172055.1	470.5227	81.17082...		False	Envelope...
558835	12400391	8/5/2015...	nate@pr...	Test Run...	4	Office	13029	24975.49...	5993.174...	50.8	173803	517.9599	85.26945...		False	Envelope...
558835	12400392	8/5/2015...	nate@pr...	Test Run...	4	Office	13029	25200.55...	6549.701...	51.148	175369.2	566.0577	89.37120...		False	Envelope...
558835	12400393	8/5/2015...	nate@pr...	Test Run...	4	Office	13029	25467.82...	7107.072...	51.536	177229.1	614.2285	93.55546...		False	Envelope...



Simple Tools for Gaining Insight into Data, Proving Ground

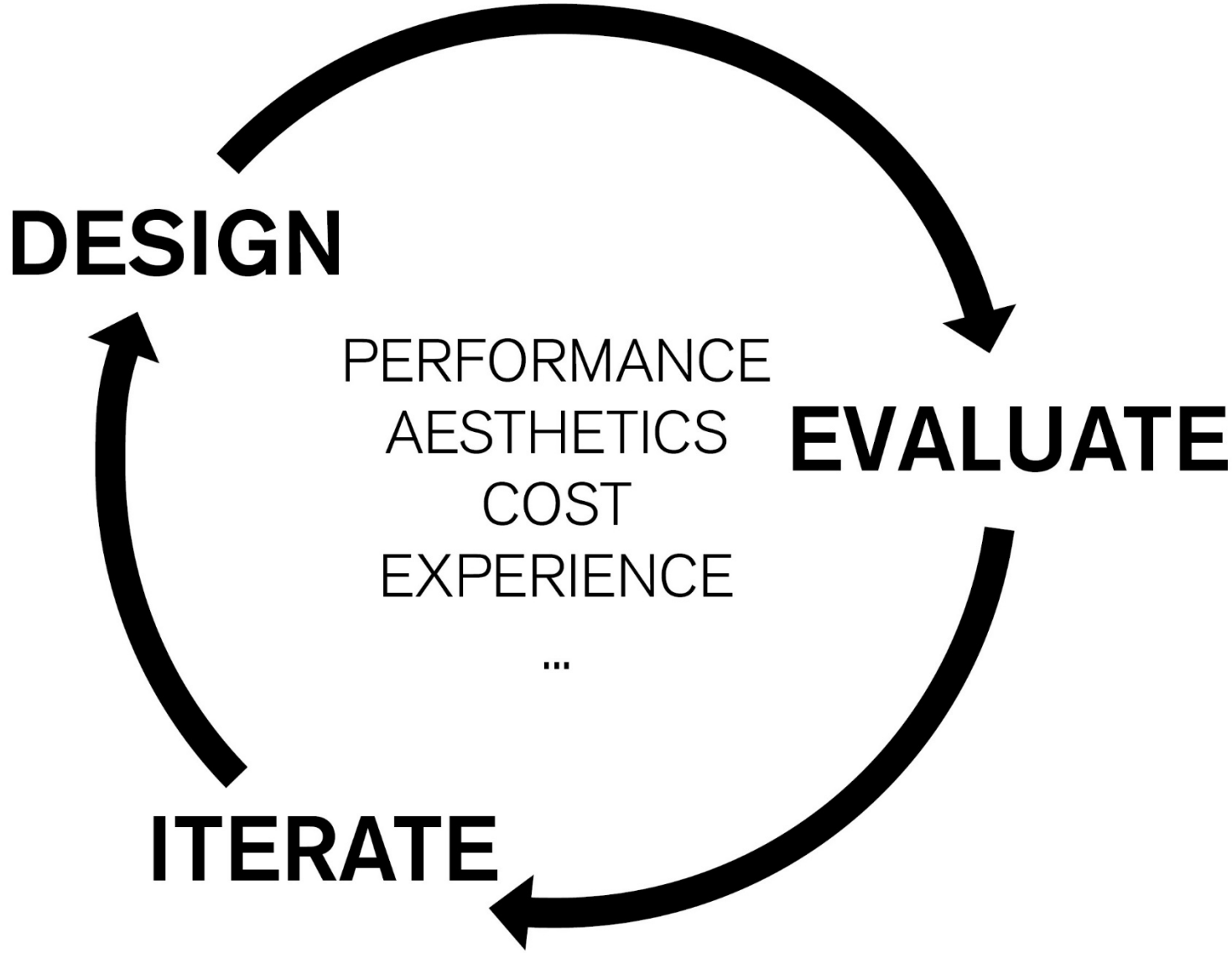


Project Management for Building Teams, Proving Ground



Knowledge Assessment Methodology, Proving Ground

You can use data to deliver value in your business and drive performance in your buildings.


DESIGN
EVALUATE
ITERATE
PERFORMANCE
AESTHETICS
COST
EXPERIENCE
...

nbbj digital practice

BIM

APP DEVELOPMENT

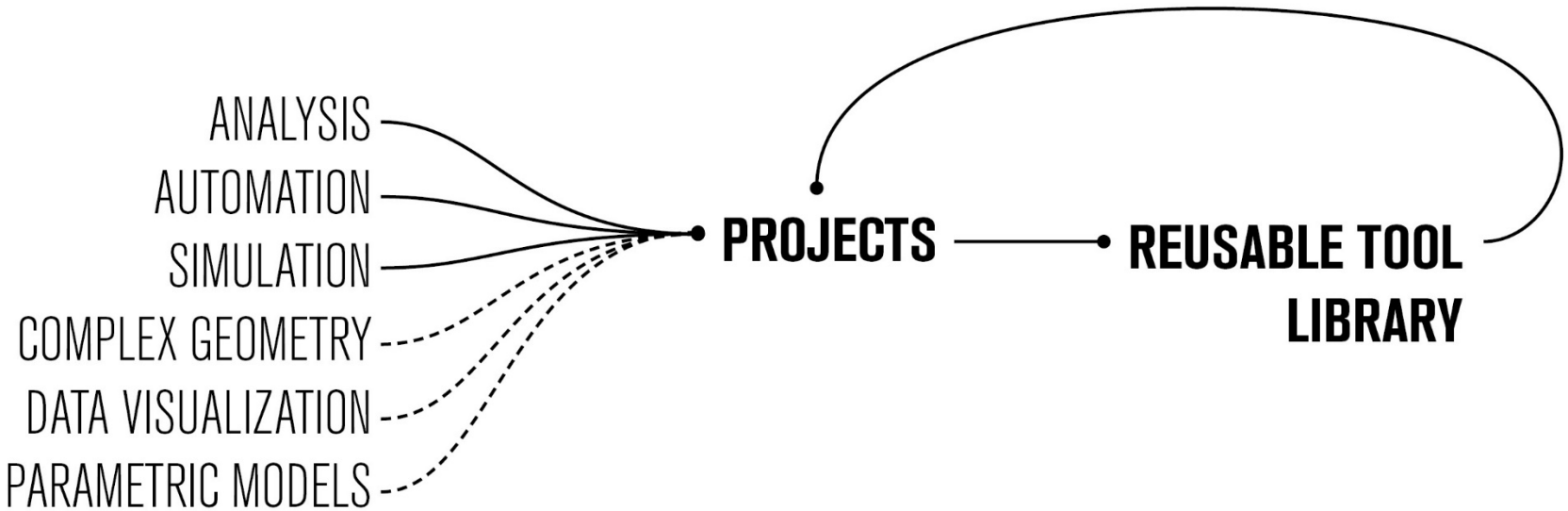
DESIGN COMPUTATION

VISUAL COMMUNICATION

PERFORMANCE ANALYSIS

nbbj digital practice

DESIGN COMPUTATION GROUP



DESIGN COMPUTATION LEADERSHIP

AUTOMATE THE TEDIOUS STUFF

1. Division 11 Section "Audio-Visual Equipment".
2. Division 12 Section "Window Treatments".
3. Division 23 Section "Instrumentation and Control for HVAC".
4. Division 25 Section "Integrated Automation Control of Electrical Systems".
5. Division 26 Section "Panelboards".
6. Division 26 Section "Wiring Devices".
7. Division 26 Section "Lighting Devices".
8. Division 26 Section "Interior Lighting".
9. Division 27 Section "Communications Horizontal Cabling".
10. Division 28 Section "Electronic Access Control and Intrusion Detection".

1.10 PROJECT CONDITIONS

A. Environmental Conditions Range:
   1. Temperature: 32 – 104 degrees F.
   2. Relative Humidity: 10 – 90 percent, noncondensing.

1.11 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of modular dimming controls system the fail in materials or workmanship within the specified warranty period following substantial completion.
   1. Warranty Period: Touch screen display and overlay components: 90 days.
   2. Warranty Period: Disc drives and other moving parts, pan/tilt heads, and power supplies: 1 year.
   3. Warranty Period: Other components, 3 years.

B. Manufacturer's Extended Support Service: Extended telephone support: Unlimited period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products of Crestron Electronics, Inc., Rockleigh, NJ 07647, Phone (800)237-2041, Fax: (201)767-1903, www.crestron.com.

2.2 SYSTEM CHARACTERISTICS

A. Web-accessible, network-connected programmable lighting control system that receives digital or analog signals from addressable input devices, assembles signals at central signal processor, and distributes operating signals to addressable control devices that effect a change in state.
   1. Electronic power switching modules and relays process signals and effect circuit on-off switching, emergency switching, and 0 – 10V fluorescent dimming where indicated. Emergency switching overrides preset state and puts each circuit to

   4) Individually adjustable ground-fault pickup and time, with i-squared-t setting .
f. One test kit to test each trip function.
g. Battery backup for informational displays after automatic trip, with battery status indicator.

H. Fusible Switches: Fixed-mounted, manually operated, electrically tripped, fusible, quick-make, quick-break switch. Comply with UL 98.
   1. Indication whether the switch is open or closed, and provisions for padlocking the operating handle.
   2. With fuse clips and fuses.
   3. Electrically tripped switches shall include:
      a. Shunt trip.
      b. [illegible]
      c. Single-phase protection, tripping the switch on loss of a source phase.
      d. Blown fuse protection, tripping the switch on a blown fuse, with blown fuse indication.

2.9 LOW-VOLTAGE INSTRUMENTS SECTION

A. Instrument Transformers: Comply with IEEE C57.13.
   1. Potential Transformers: Secondary voltage rating of 120 V and NEMA C 12.11 Accuracy Class of 0.3 with burdens of W, X, and Y.
   2. Current Transformers: Burden and Accuracy Class suitable for connected relays, meters, and instruments.

B. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems.
   1. Inputs from sensors or 5-A current-transformer secondaries, and potential terminals rated to 600 V.
   2. Switch-selectable digital display with the following features:
      a. Phase Currents, Each Phase: Plus or minus 1 percent.
      b. Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent.
      c. Phase-to-Neutral Voltages Three Phase: Plus or minus 1 percent.
      d. Three-Phase Real Power: Plus or minus 2 percent.
      e. Three-Phase Reactive Power: Plus or minus 2 percent.
      f. Power Factor: Plus or minus 2 percent.
      g. Frequency: Plus or minus 0.5 percent.
      h. Integrated Demand, with Demand Interval Selectable from 5 to 60 Minutes: Plus or minus 2 percent.
      i. Accumulated energy, in megawatt hours, plus or minus 2 percent; stored values unaffected by power outages for up to 72 hours.
   3. Communications module suitable for remote monitoring of meter quantities and functions. Interface communication and metering requirements according to Section 260913 "Electrical Power Monitoring and Control."
   4. Mounting: Display and control unit that is flush or semiflush mounted in instrument compartment door.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Fuses: One for every 10 of each type and rating, but no fewer than one of each.
   2. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.
   3. Filters: One set each of lubricating oil, fuel, and combustion-air filters.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
   1. Maintenance Proximity: Not more than four hours' normal travel time from Installer's place of business to Project site.
   2. Engineering Responsibility: Preparation of data for vibration isolators and seismic restraints of engine skid mounts. Including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 200 miles of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.

C. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL), and that is acceptable to authorities having jurisdiction.
   1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

D. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

F. Comply with ASME B15.1.

G. Comply with NFPA 37.

H. Comply with NFPA 70.

I. Comply with NFPA 110 requirements for Level 1 emergency power supply system.

E. Field quality-control test reports.

F. Operation and Maintenance Data: For switchgear and switchgear components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
   1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
   2. Time-current curves, including selectable ranges for each type of overcurrent protective device.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
   1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

B. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7.

C. Source Limitations: Obtain each type of switchgear and associated components through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of switchgear and are based on the specific system indicated. Refer to Section 016000 "Product Requirements."

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

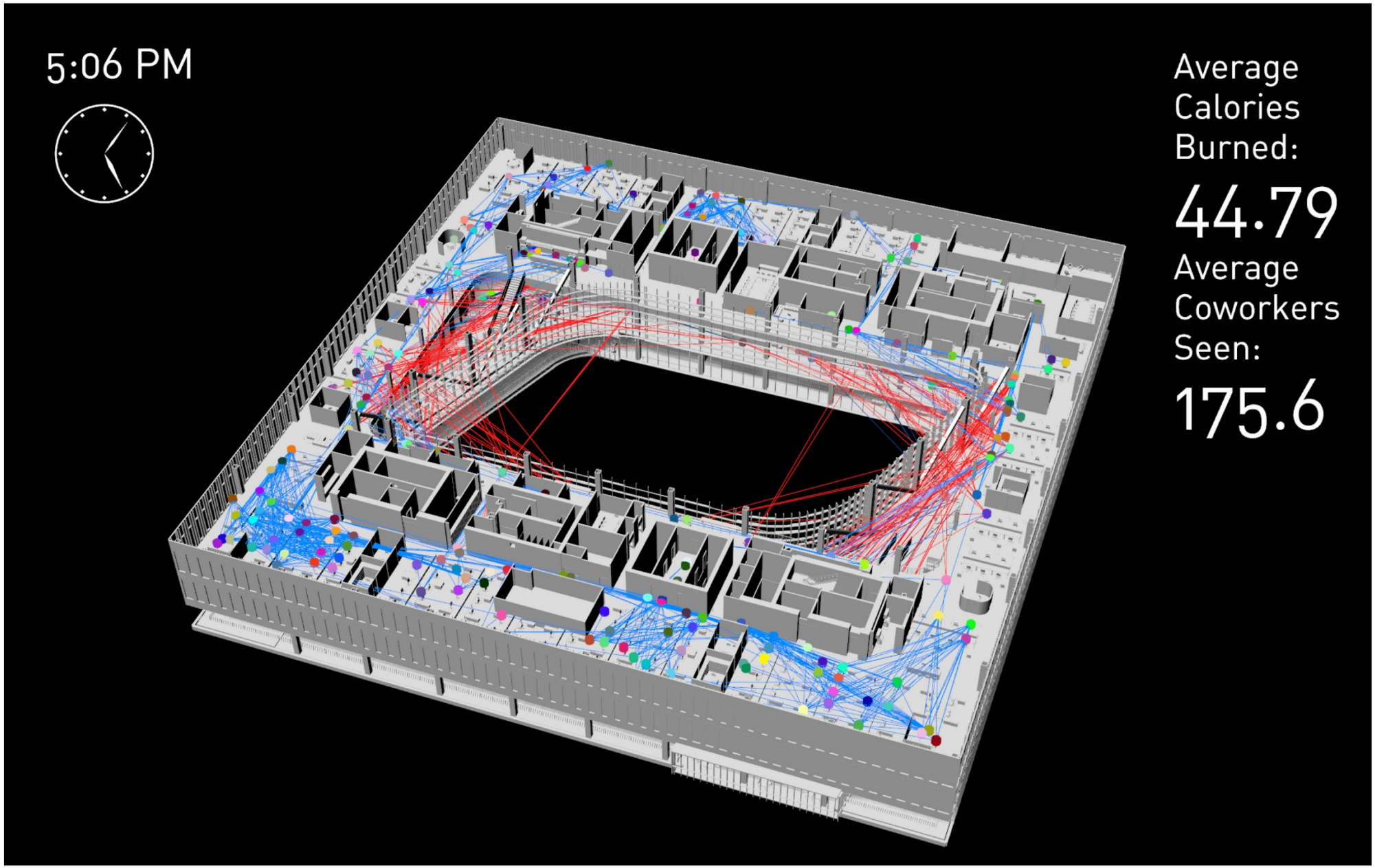
F. Comply with IEEE C2.

1.7 DELIVERY, STORAGE, AND HANDLING

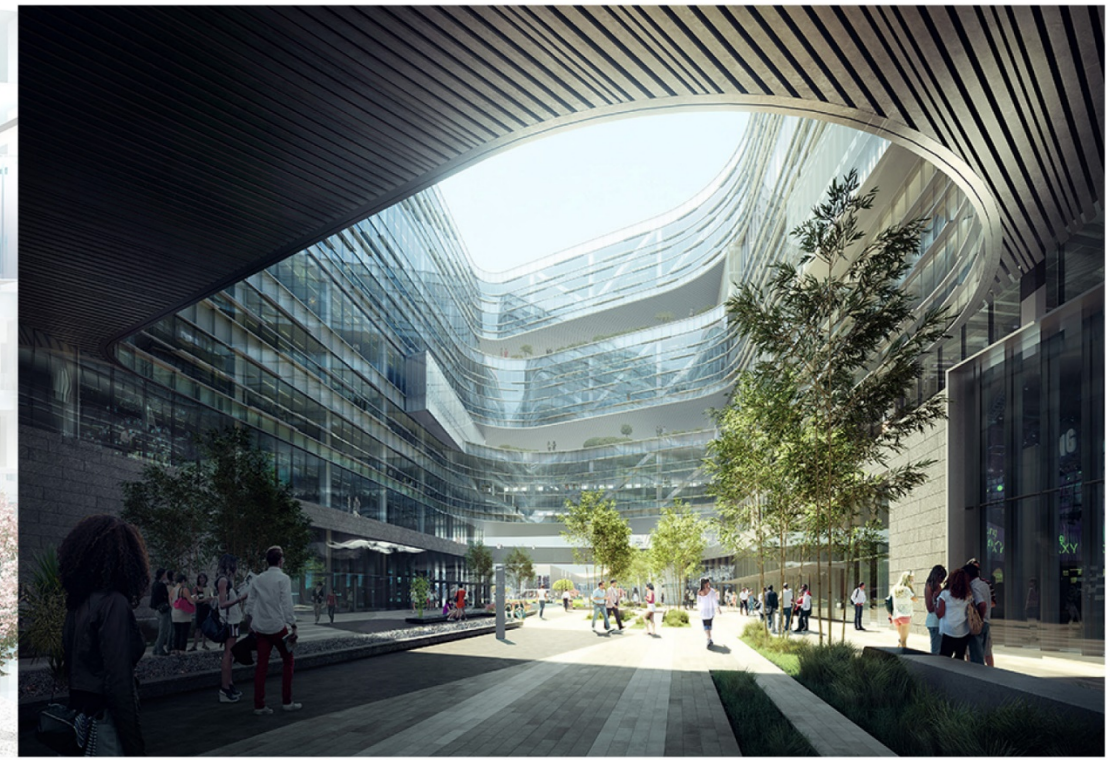
A. Deliver in sections of lengths that can be moved past obstructions in delivery path as indicated.

B. Store switchgear indoors in clean dry space with uniform temperature to prevent condensation. Protect switchgear from exposure to dirt, fumes, water, corrosive substances, and physical damage.

LET CONCEPTS DRIVE COMPUTATION



LET CONCEPTS DRIVE COMPUTATION



FLEX YOUR MODELS

Geometry Parameters

Bed

Bed Width 3'

Bed Length 7'3"

Clearances

Foot of Bed 4'

Side of Bed 3'9"

Toilet Room

Length 9'7"

Depth 7'4"

Major Planning

Planning Module 16

Bay Depth 22'9"

Inboard Outboard

Same-handed Mirrored

Corridor Width 70

Corridor Shift 0.000

Patient Room Geometry

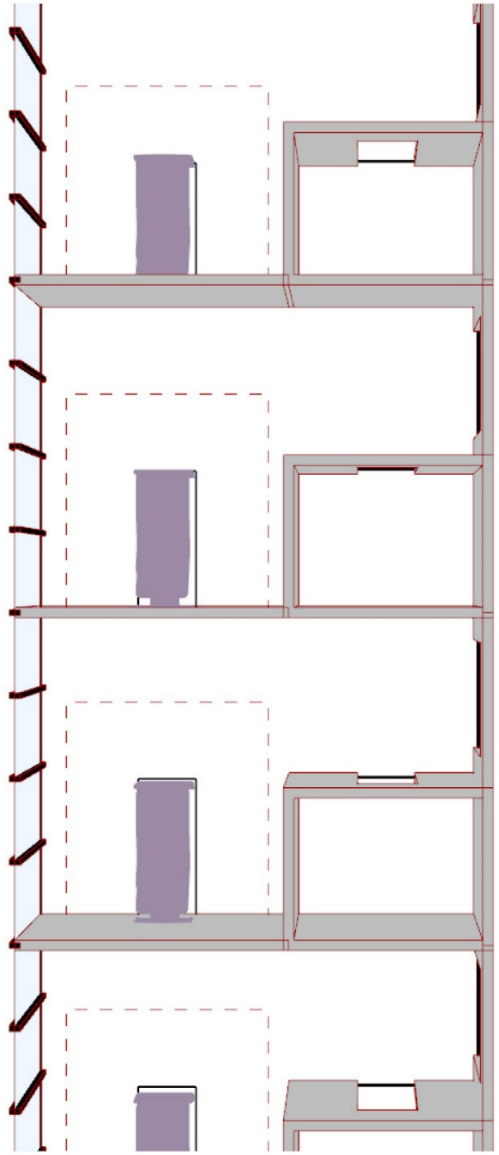
Restroom Rotation 0.000

Restroom Shift 0.000

Bed Rotation 0.000

Restroom Chamfer 0.0

Fine Tuning



Sightline Display

Patient to Patient

Caregiver to Patient

Patient to Window

Isovist Display

Patient

Caregiver

Metrics

Patient Distance to Toilet Room

12.5 ft

Percent Window View

Not Calculated

PRESETS

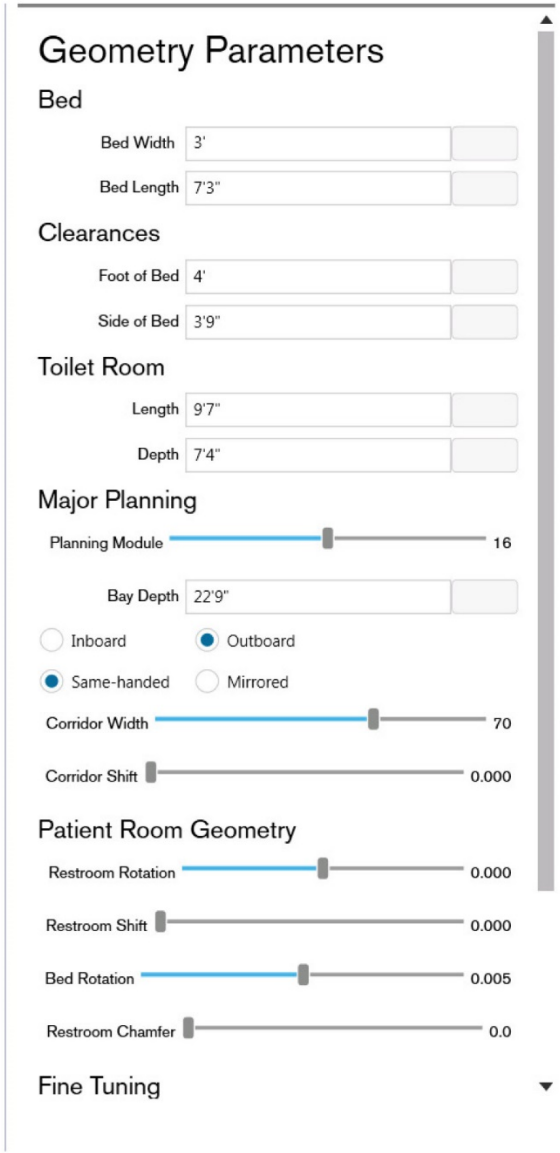
Configurations

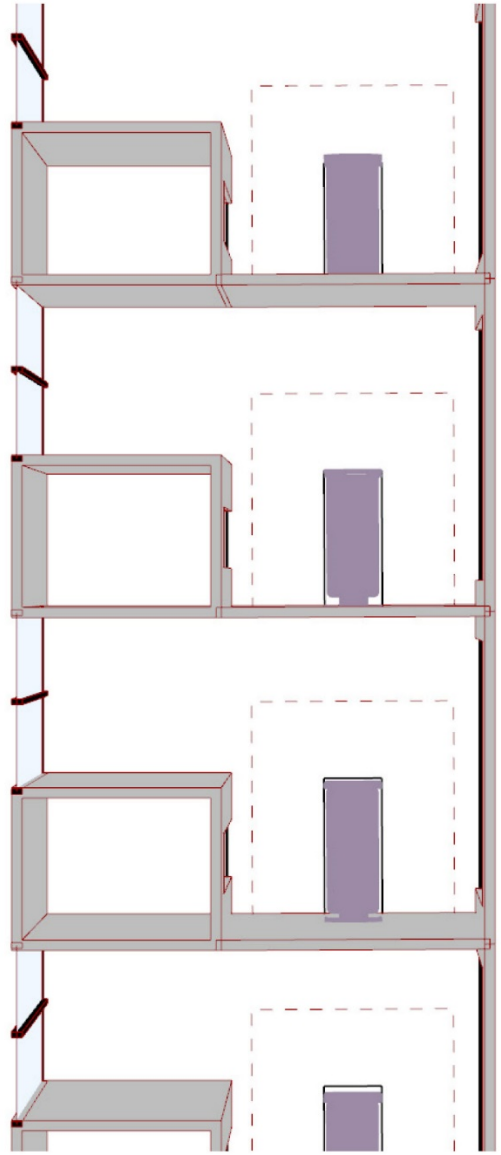
Preset Name Save

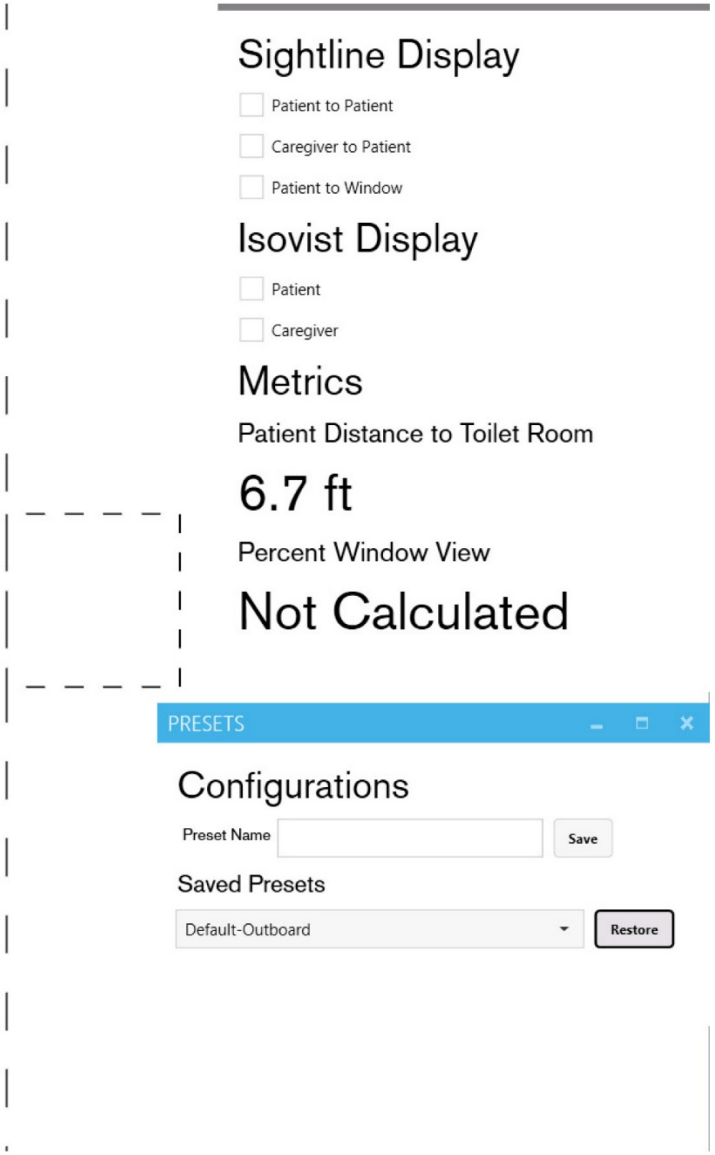
Saved Presets

Default Restore

FLEX YOUR MODELS







FLEX YOUR MODELS

Geometry Parameters

Bed

Bed Width 3'

Bed Length 7'3"

Clearances

Foot of Bed 4'

Side of Bed 3'9"

Toilet Room

Length 9'7"

Depth 7'4"

Major Planning

Planning Module 16

Bay Depth 22'9"

Inboard Outboard

Same-handed Mirrored

Corridor Width 70

Corridor Shift 0.000

Patient Room Geometry

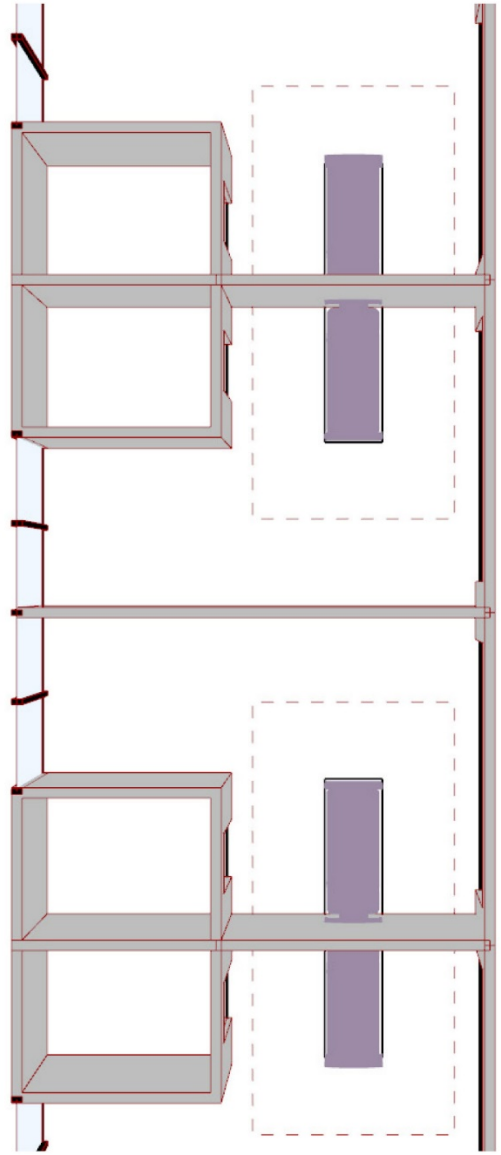
Restroom Rotation 0.000

Restroom Shift 0.000

Bed Rotation 0.000

Restroom Chamfer 0.0

Fine Tuning



Sightline Display

Patient to Patient

Caregiver to Patient

Patient to Window

Isovist Display

Patient

Caregiver

Metrics

Patient Distance to Toilet Room

6.8 ft

Percent Window View

Not Calculated

PRESETS

Configurations

Preset Name Save

Saved Presets

Default-Outboard-Mirrored Restore

FLEX YOUR MODELS

Geometry Parameters

Bed

Bed Width 3'

Bed Length 7'3"

Clearances

Foot of Bed 4'

Side of Bed 3'9"

Toilet Room

Length 9'7"

Depth 7'4"

Major Planning

Planning Module 16

Bay Depth 22'9"

Inboard Outboard

Same-handed Mirrored

Corridor Width 70

Corridor Shift 0.000

Patient Room Geometry

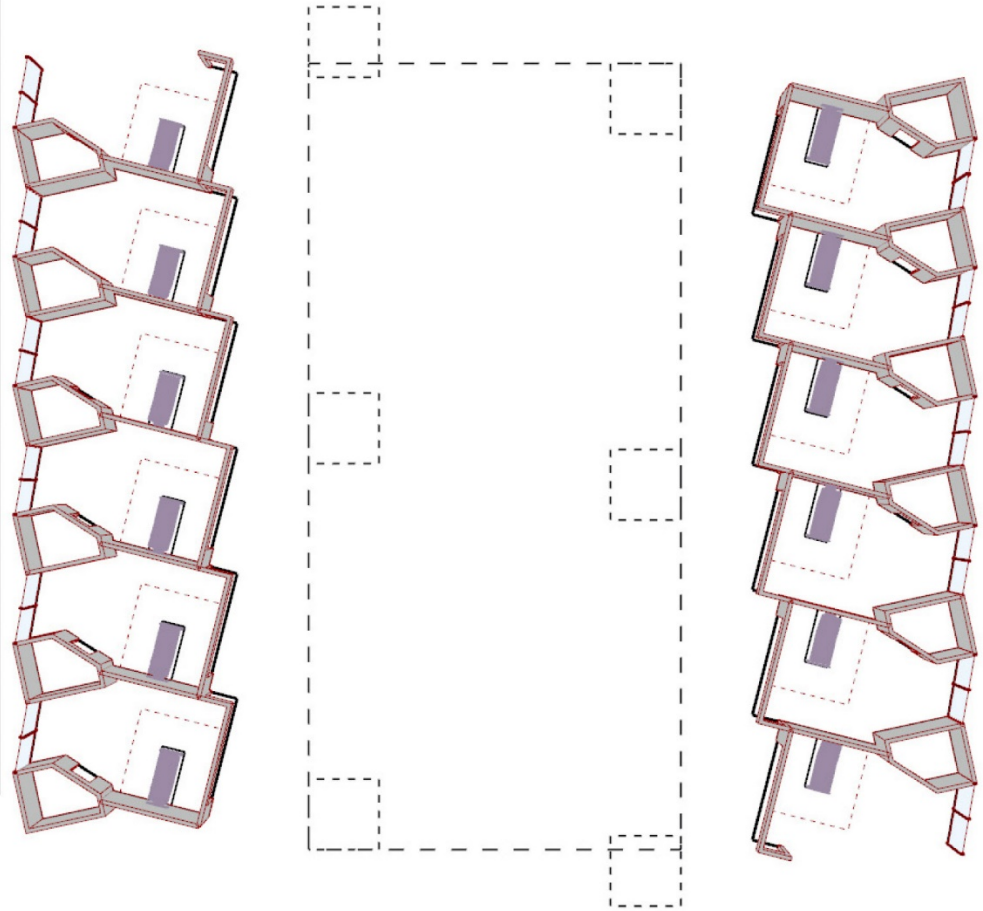
Restroom Rotation -0.215

Restroom Shift 0.231

Bed Rotation -0.246

Restroom Chamfer 4.8

Fine Tuning



Sightline Display

Patient to Patient

Caregiver to Patient

Patient to Window

Isovist Display

Patient

Caregiver

Metrics

Patient Distance to Toilet Room

9.9 ft

Percent Window View

Not Calculated

PRESETS

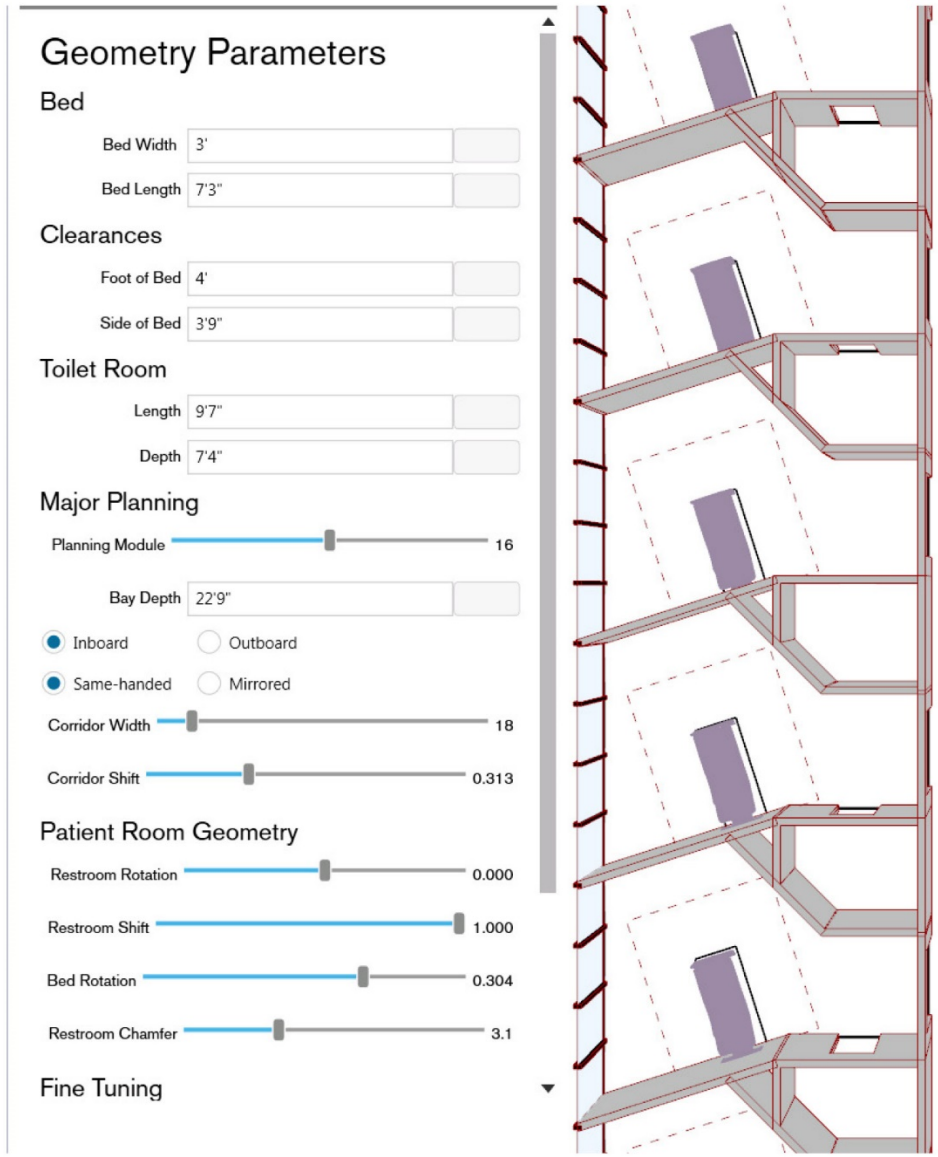
Configurations

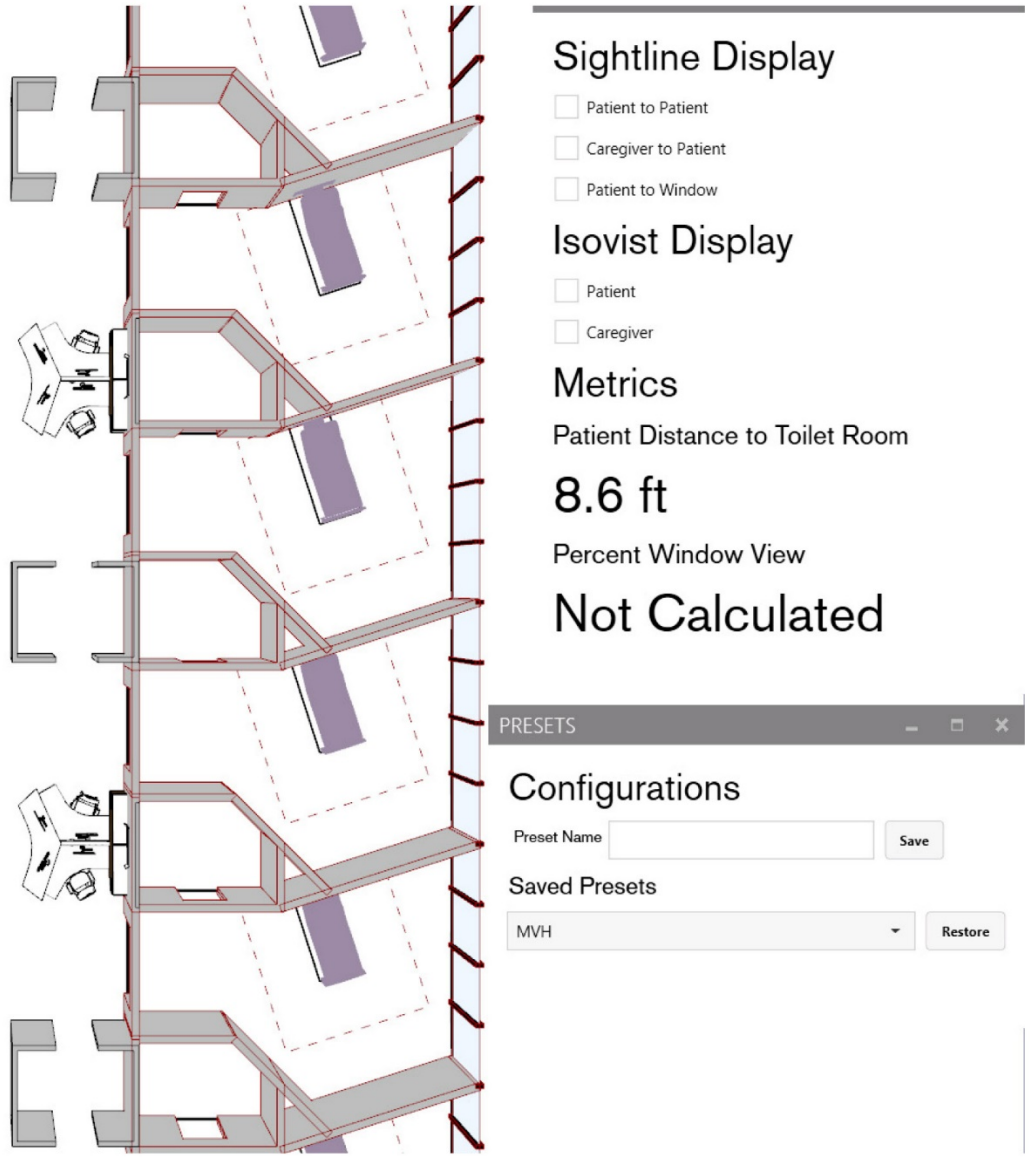
Preset Name Save

Saved Presets

Outboard-Angled Restore

FLEX YOUR MODELS





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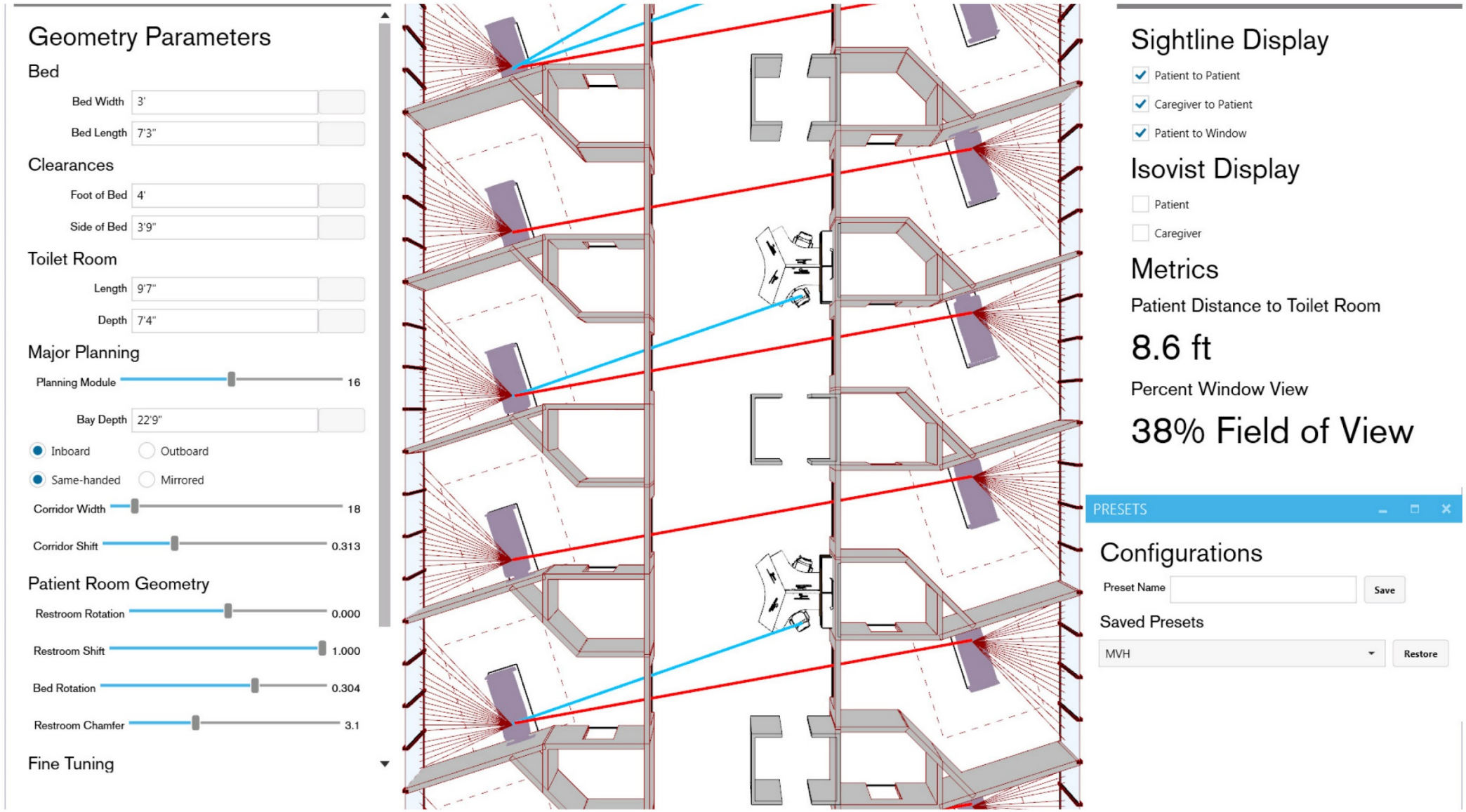

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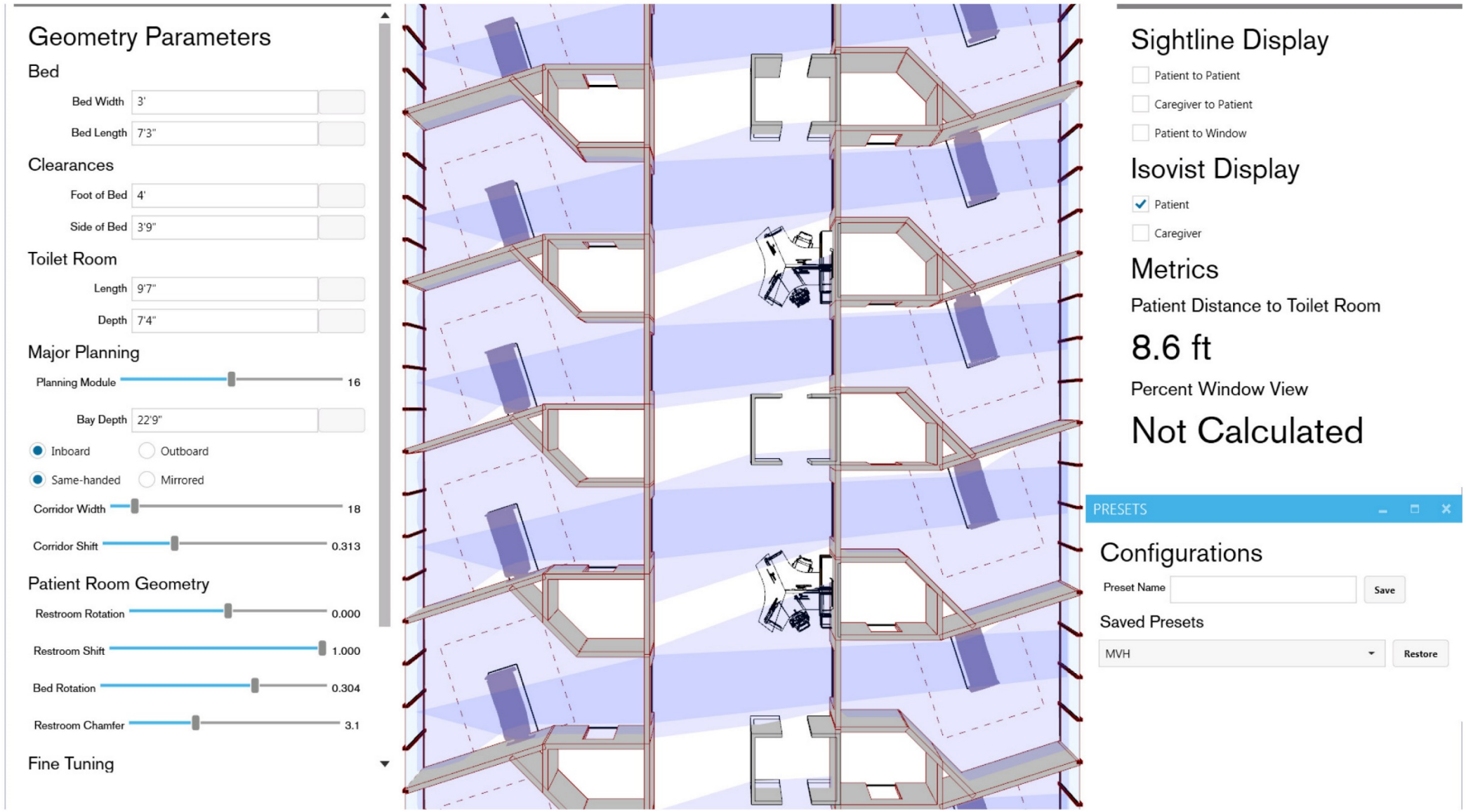

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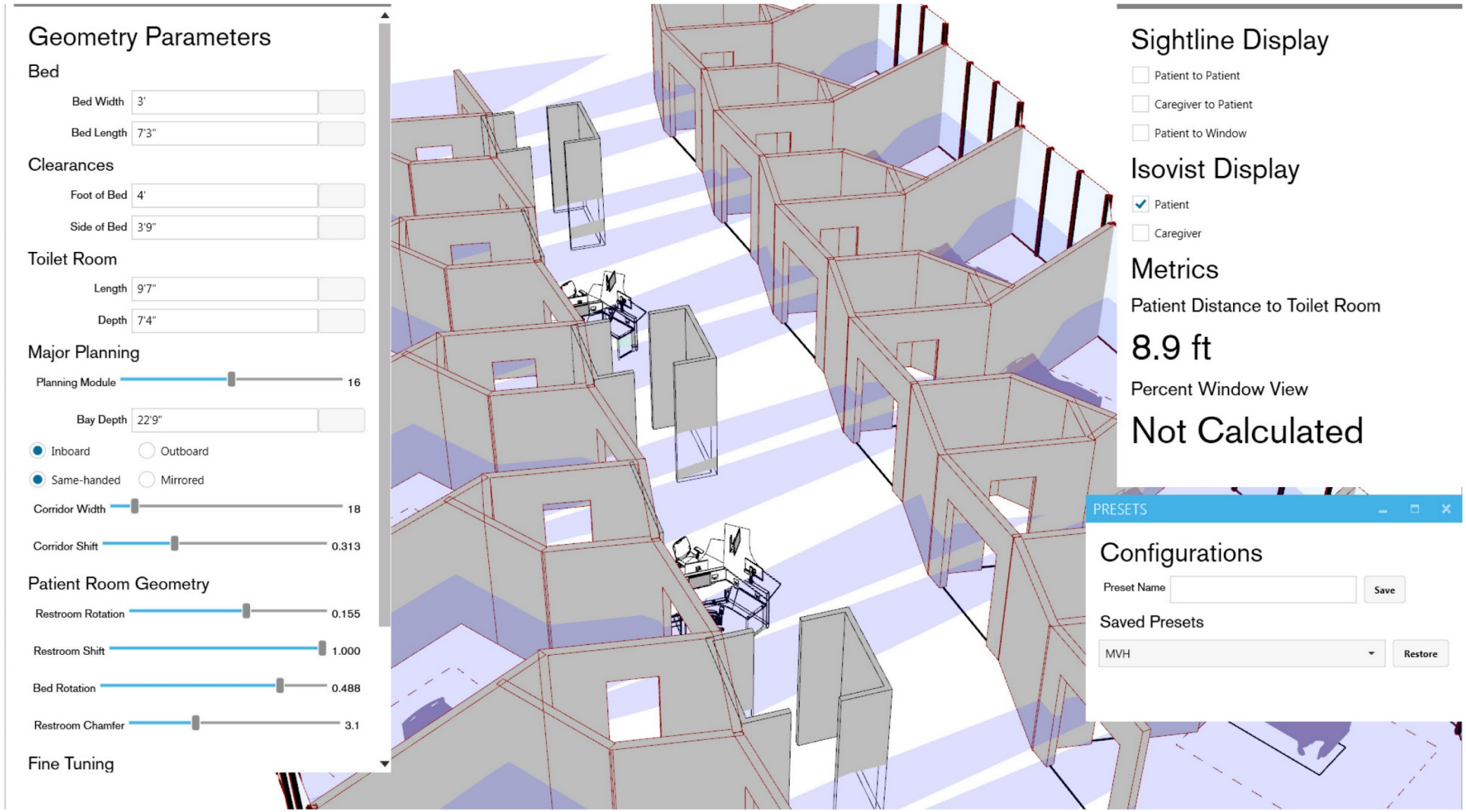

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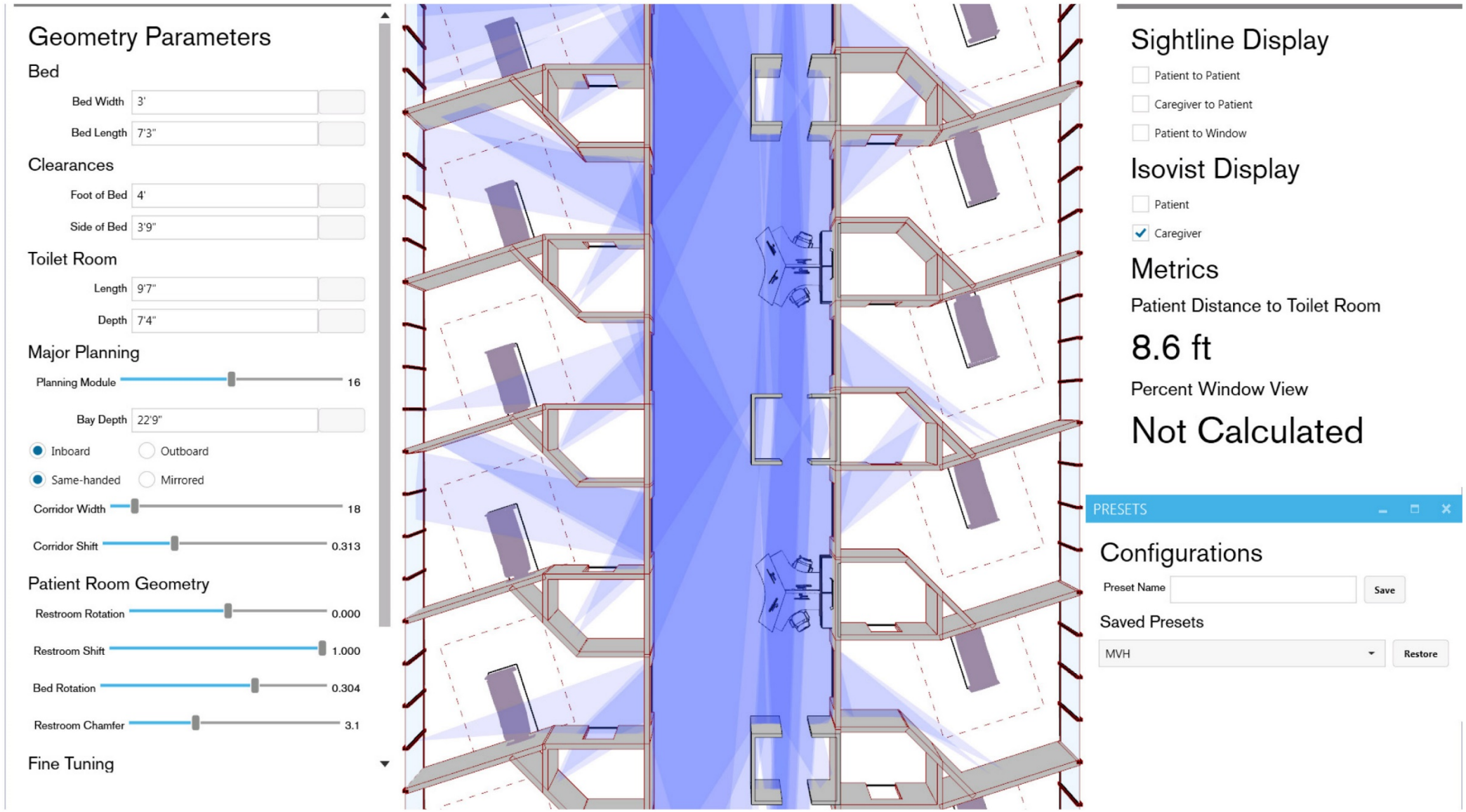

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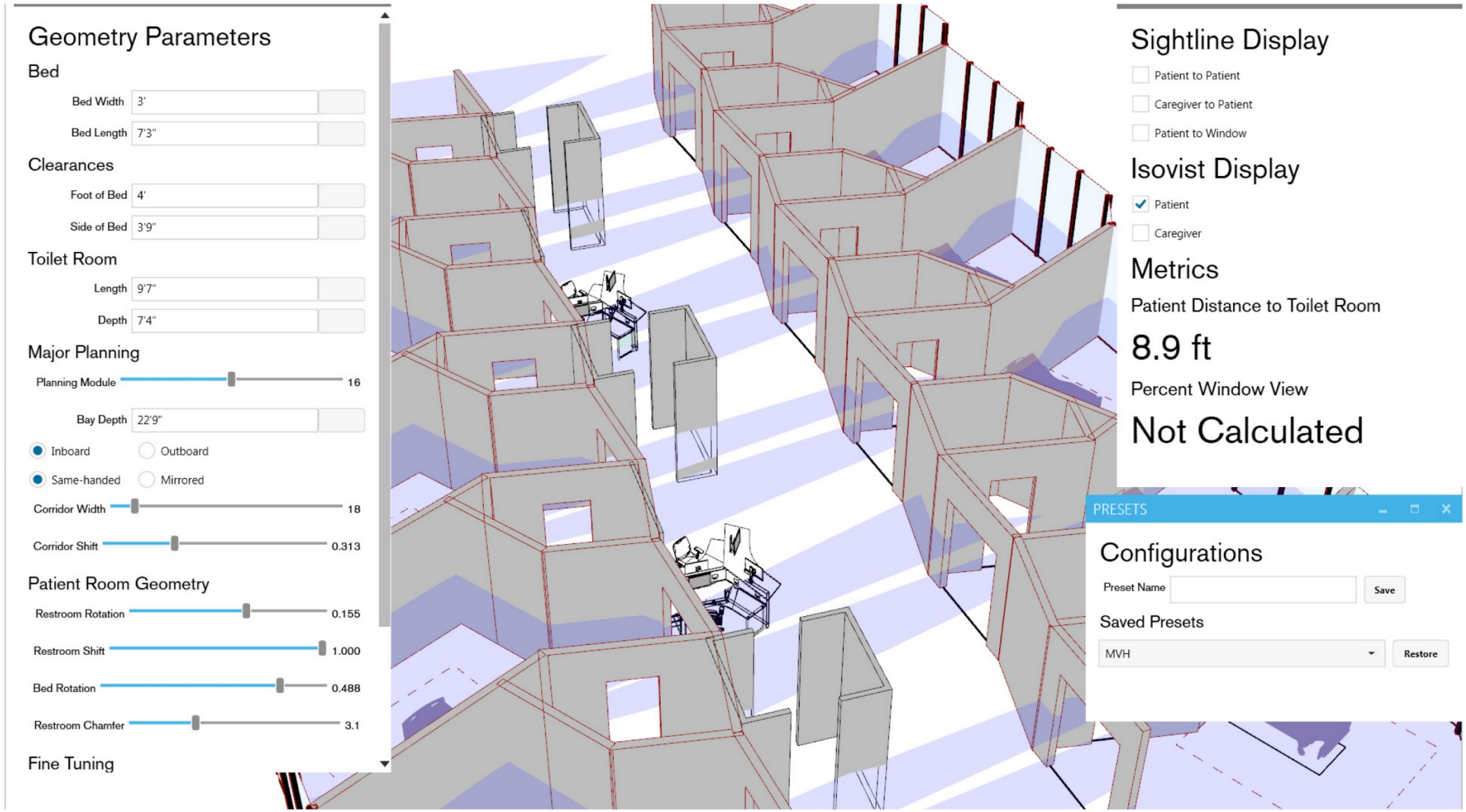
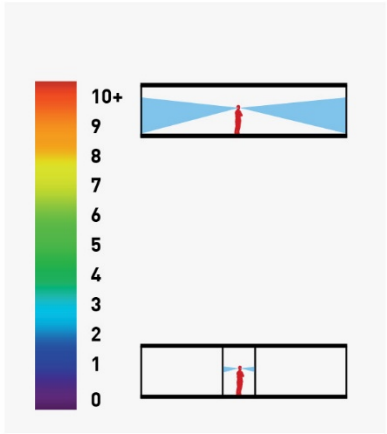
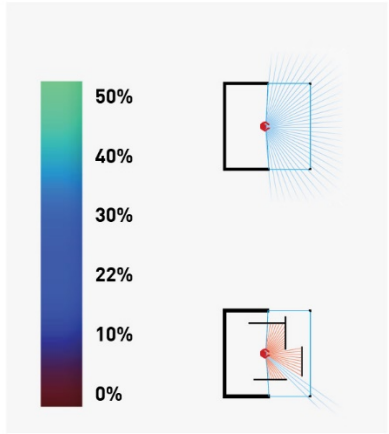


ASK YOUR MODEL QUESTIONS

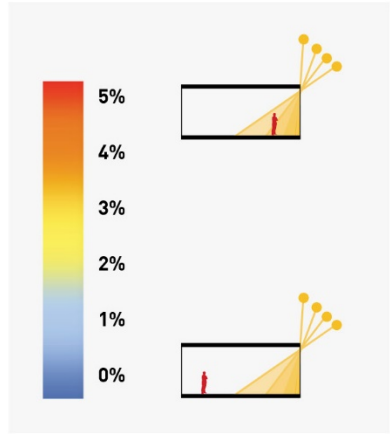
Interior Visibility Factor



Window Access Factor

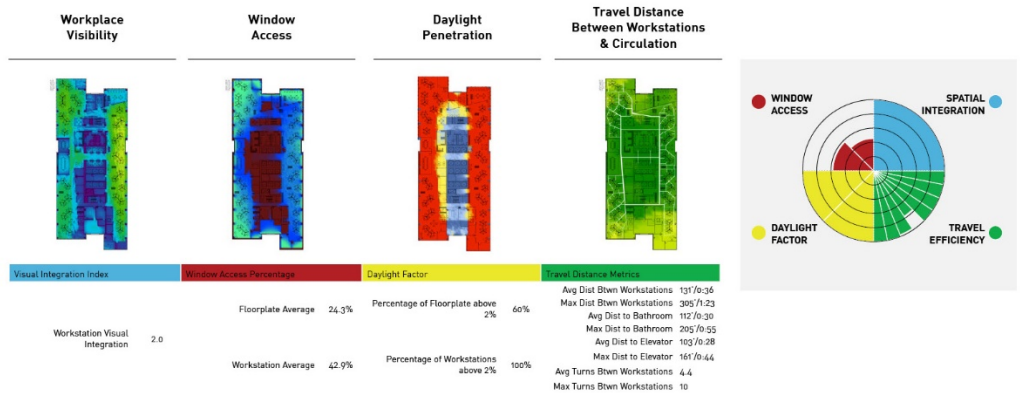


Daylight Factor

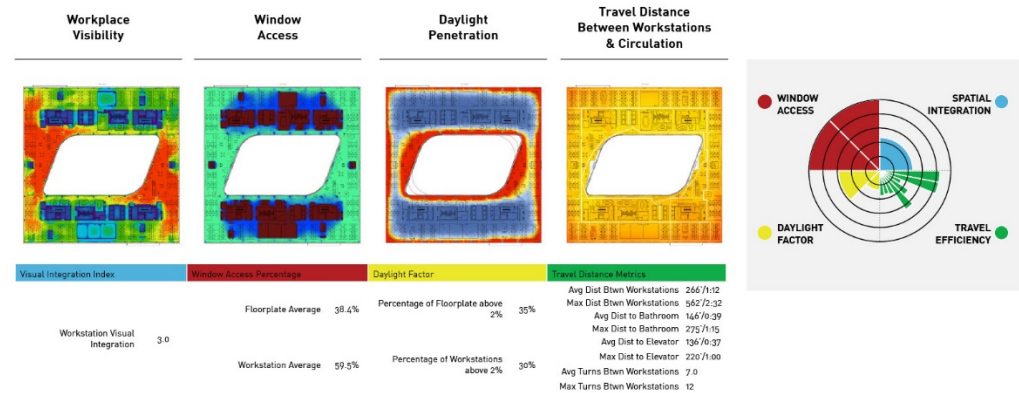


Average Travel Distance to/from location (same floor)

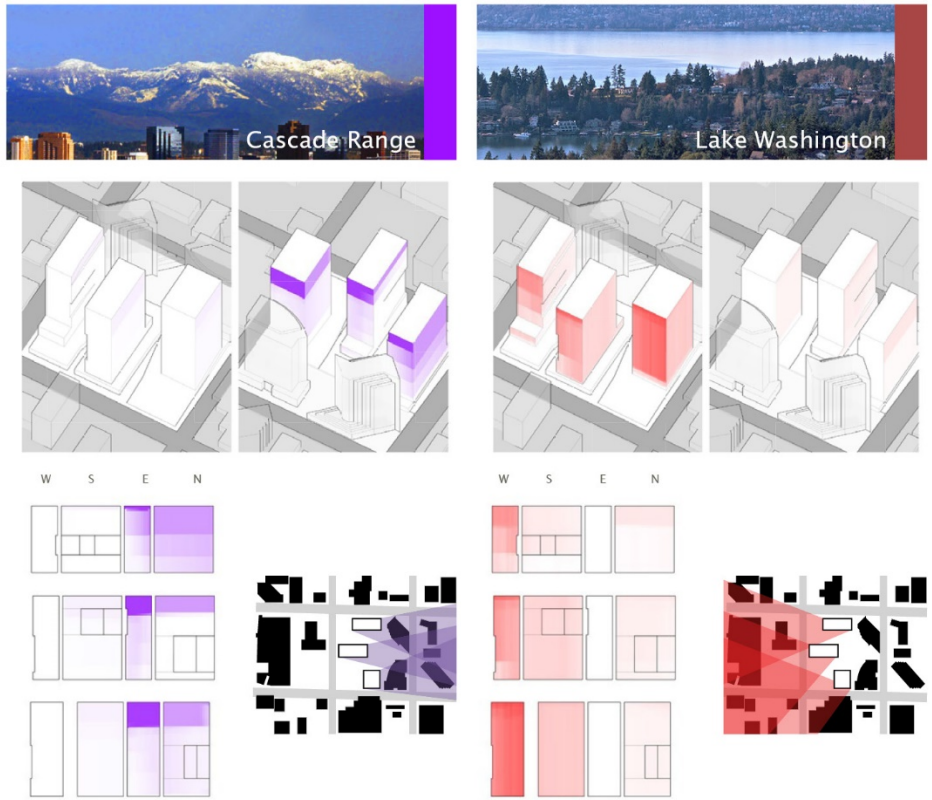
RUSSELL INVESTMENTS

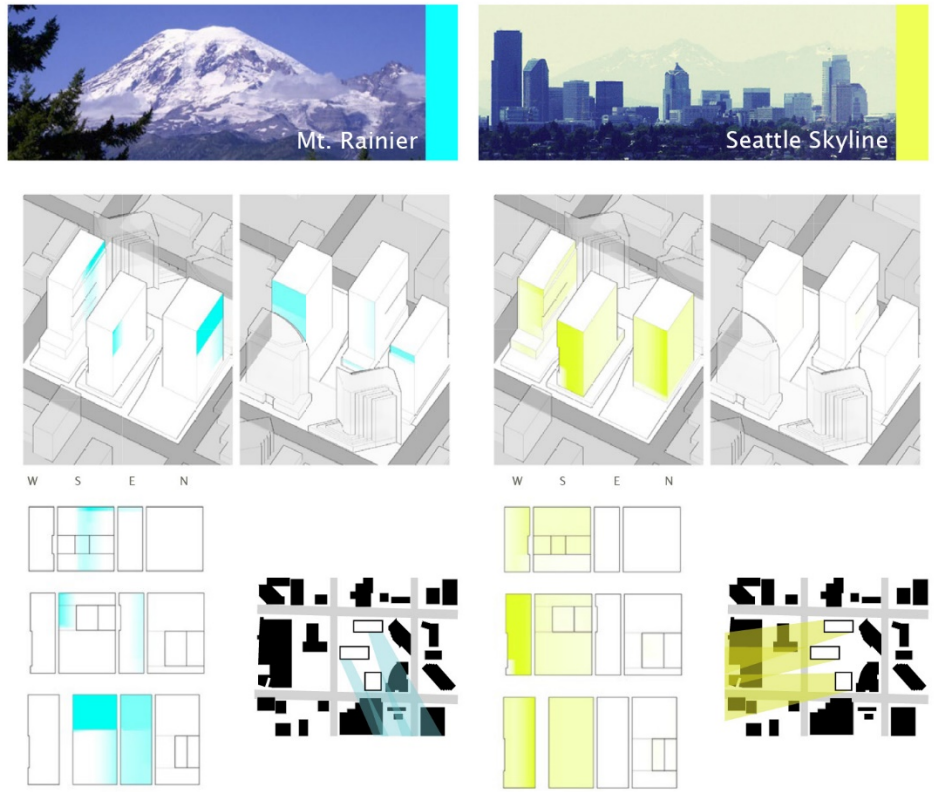


SAMSUNG



INVEST IN BUILDING TOOLS





Views are calculated from every point on the facades of the three towers to the specified landmark. Darker colors indicate a better view of the landmark in question.

NO VIEWS — BROAD VIEWS

N

INVEST IN BUILDING TOOLS

ilding Facade Above 45' with 1 View

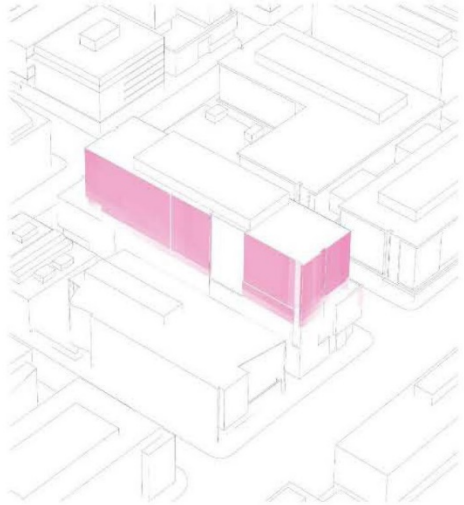
70.46%

ilding Facade Above 45' with 2 Views

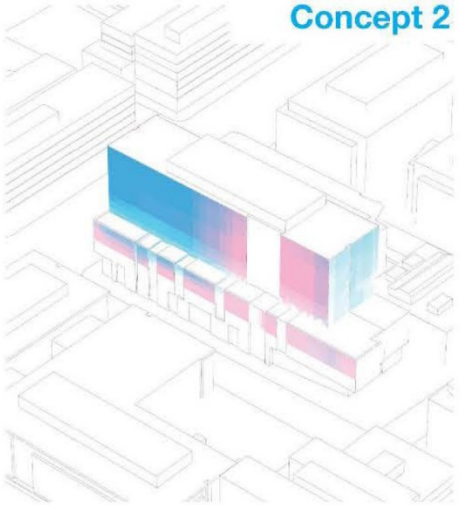
22.96%

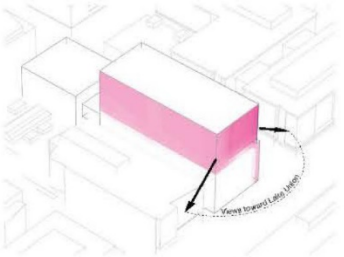
Lake Union **62.32%**

Space Needle **31.10%**



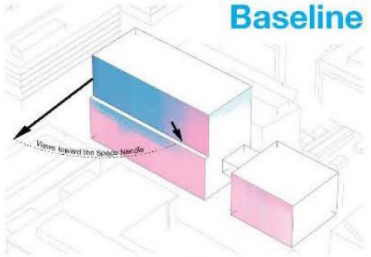
Concept 2



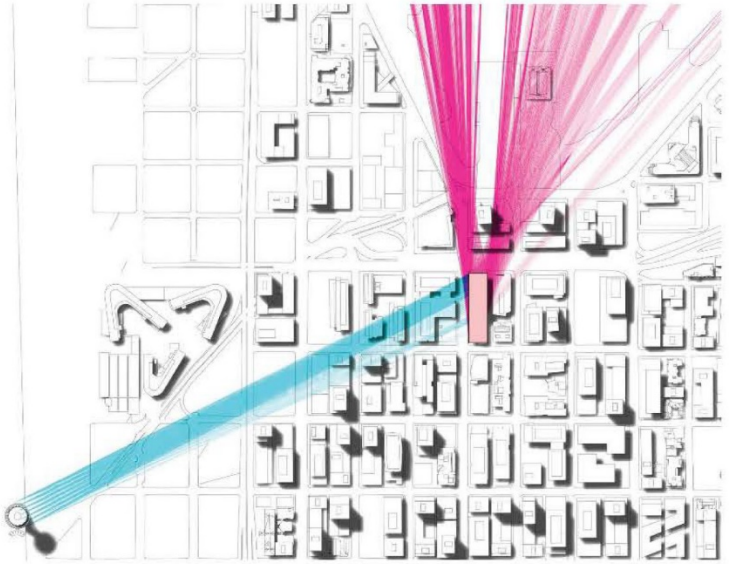


Baseline View Target 1 - Lake Union

Baseline



Baseline View Target 2 - Space Needle



ilding Facade Above 45' with 1 View

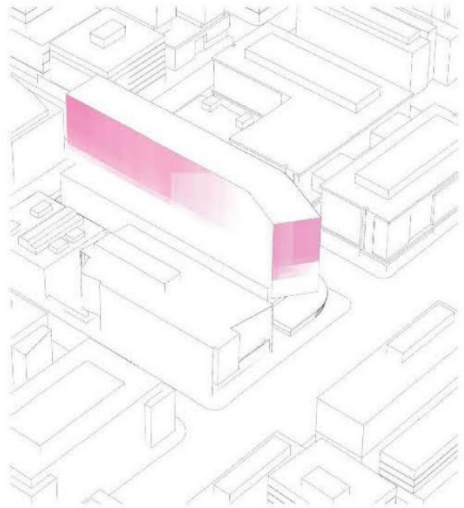
78.61%

ilding Facade Above 45' with 2 Views

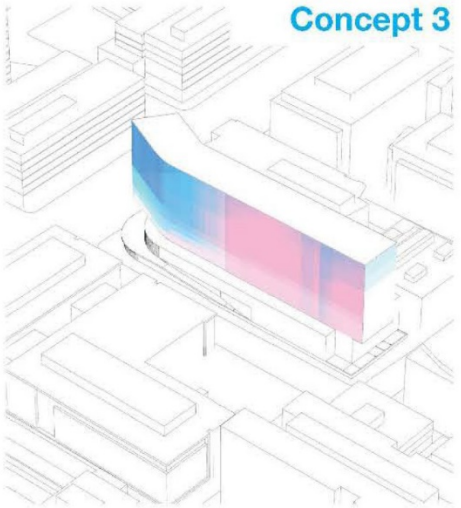
24.42%

Lake Union **67.68%**

Space Needle **33.84%**

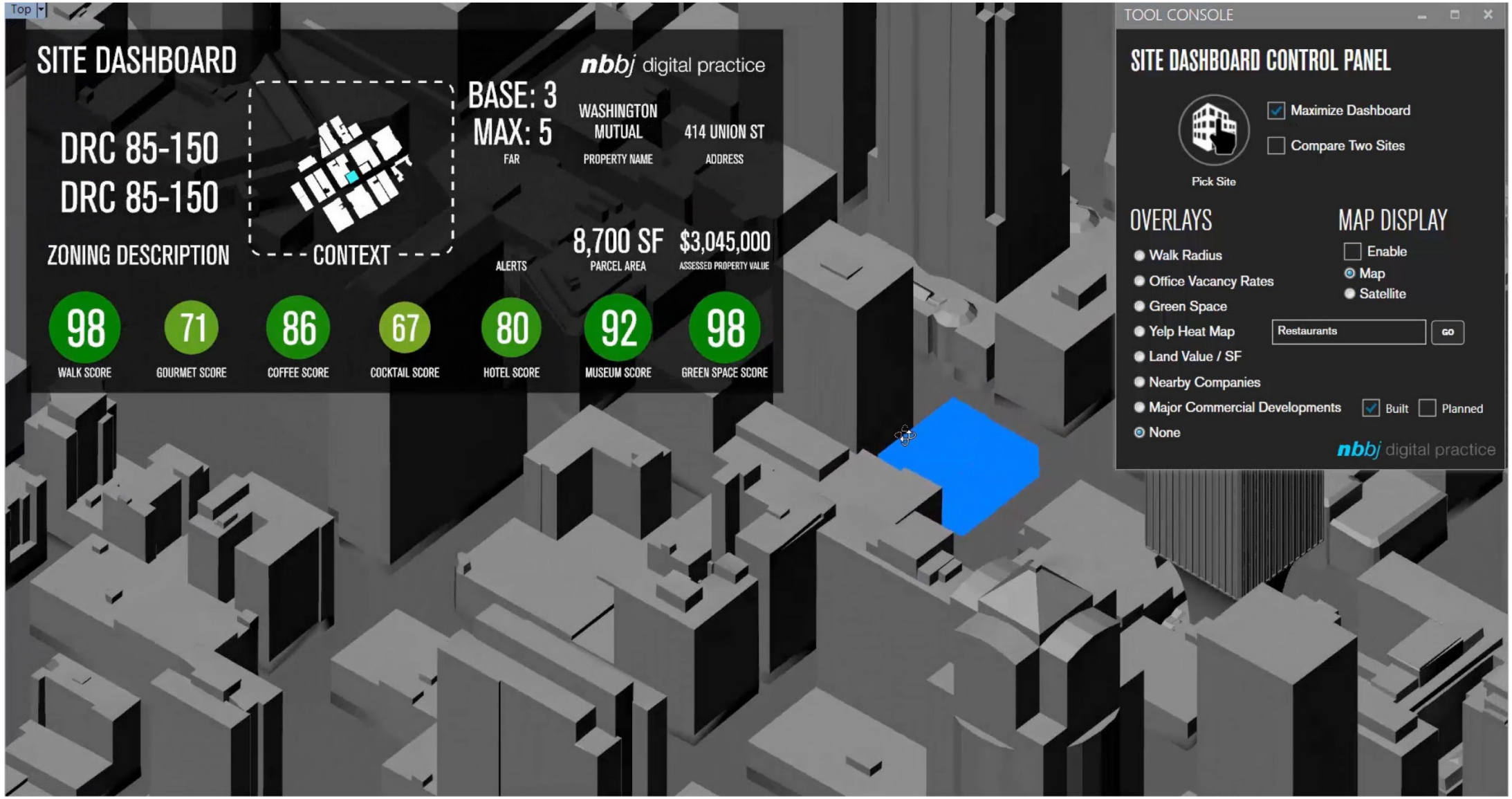


Concept 3



This view analysis shows the percentage of views above 45' from street grade for both concepts A and C.2. We have identified two main potential view targets for our site: 1) Lake Union, displayed in magenta, and; 2) the Seattle Space Needle, displayed in blue. The percentages shown are based on the concepts building mass and not from the baseline design. What we found is that the long skinny design of concept C.2, creates a much higher potential, about 30% more, than concept A for the given target views. The majority of the views will be toward Lake Union, but a surprisingly large amount in both schemes will get a view of the Seattle Space Needle.

ADDRESS CLIENT VALUE



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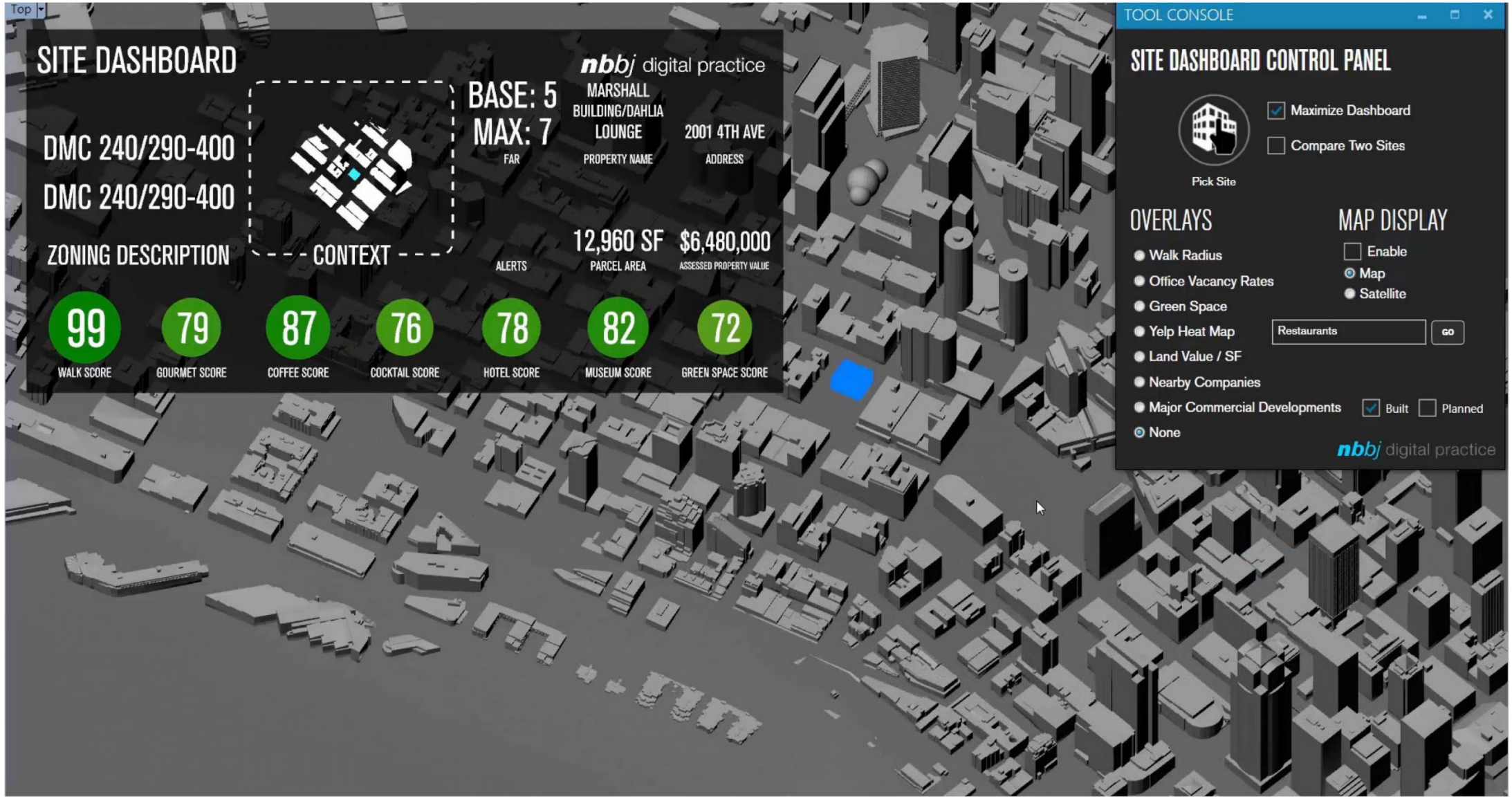

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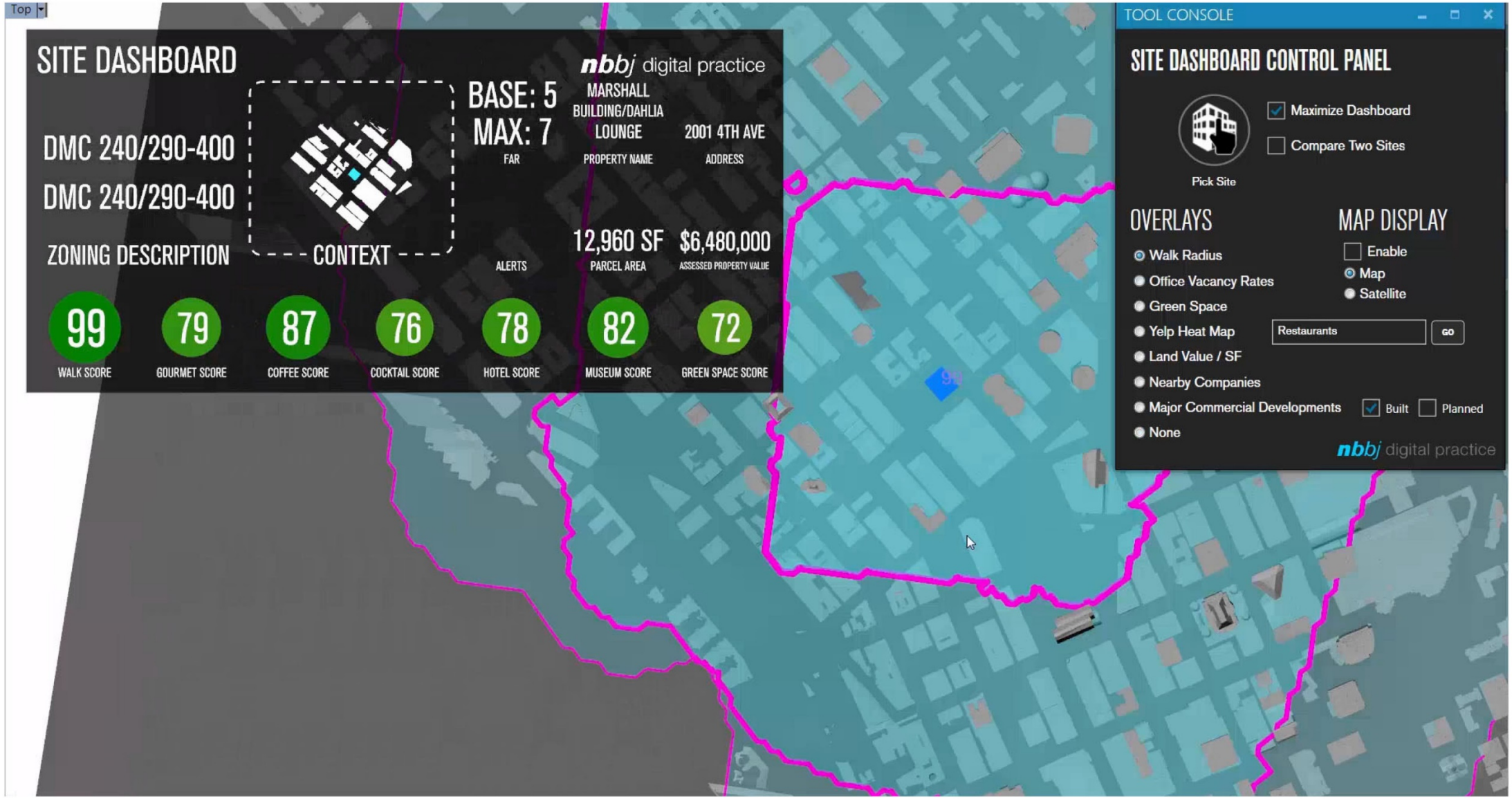

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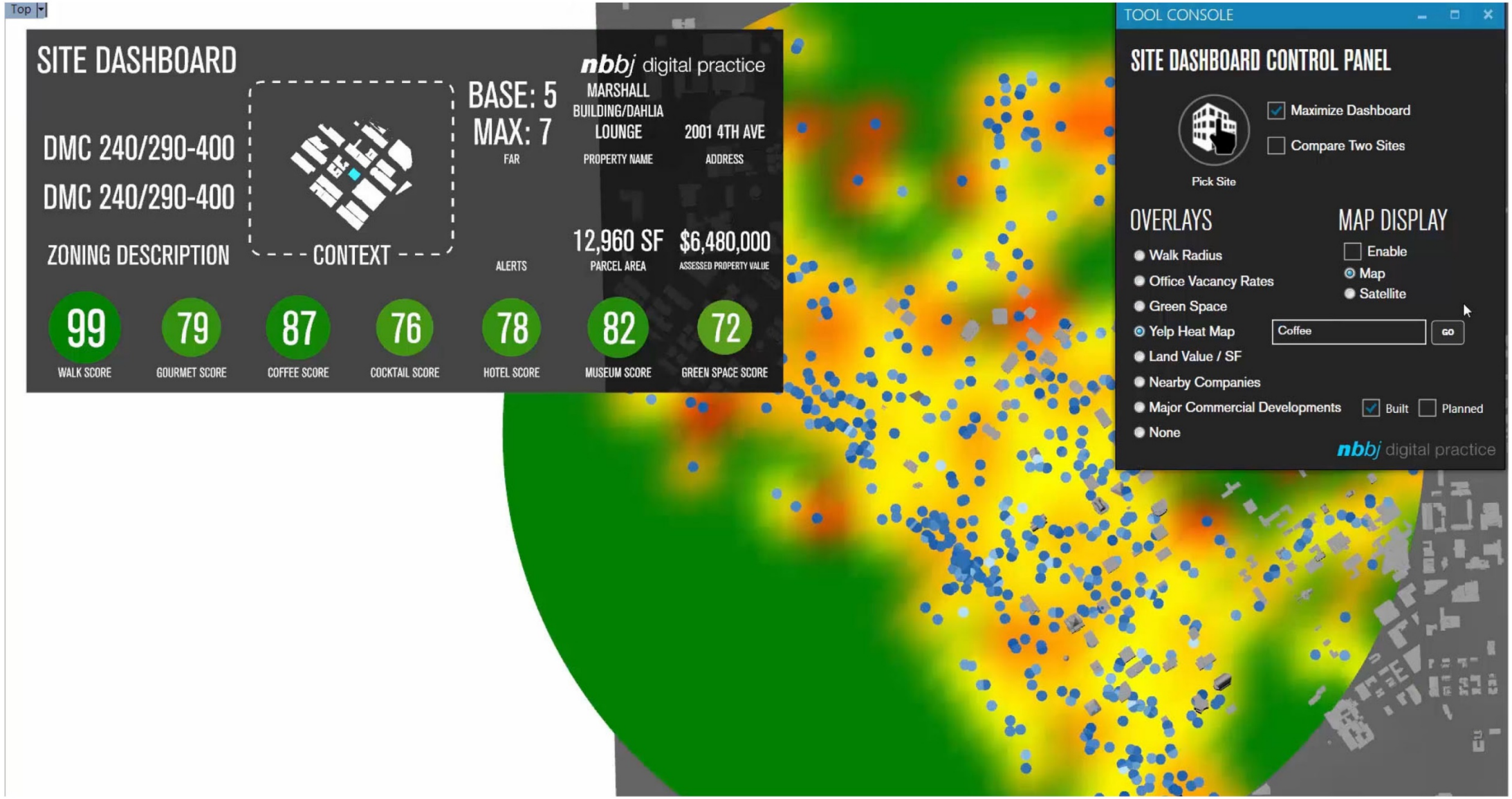

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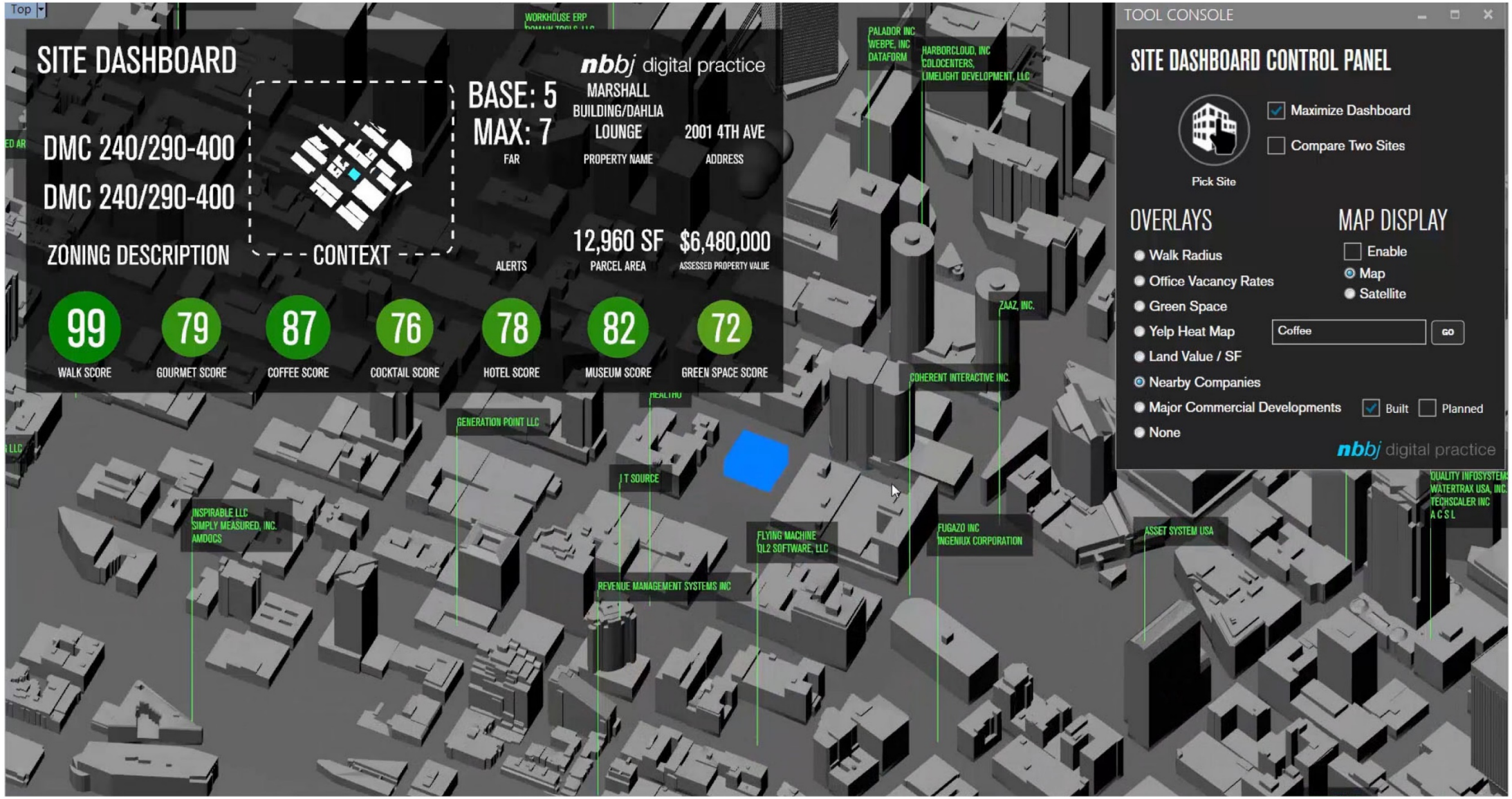

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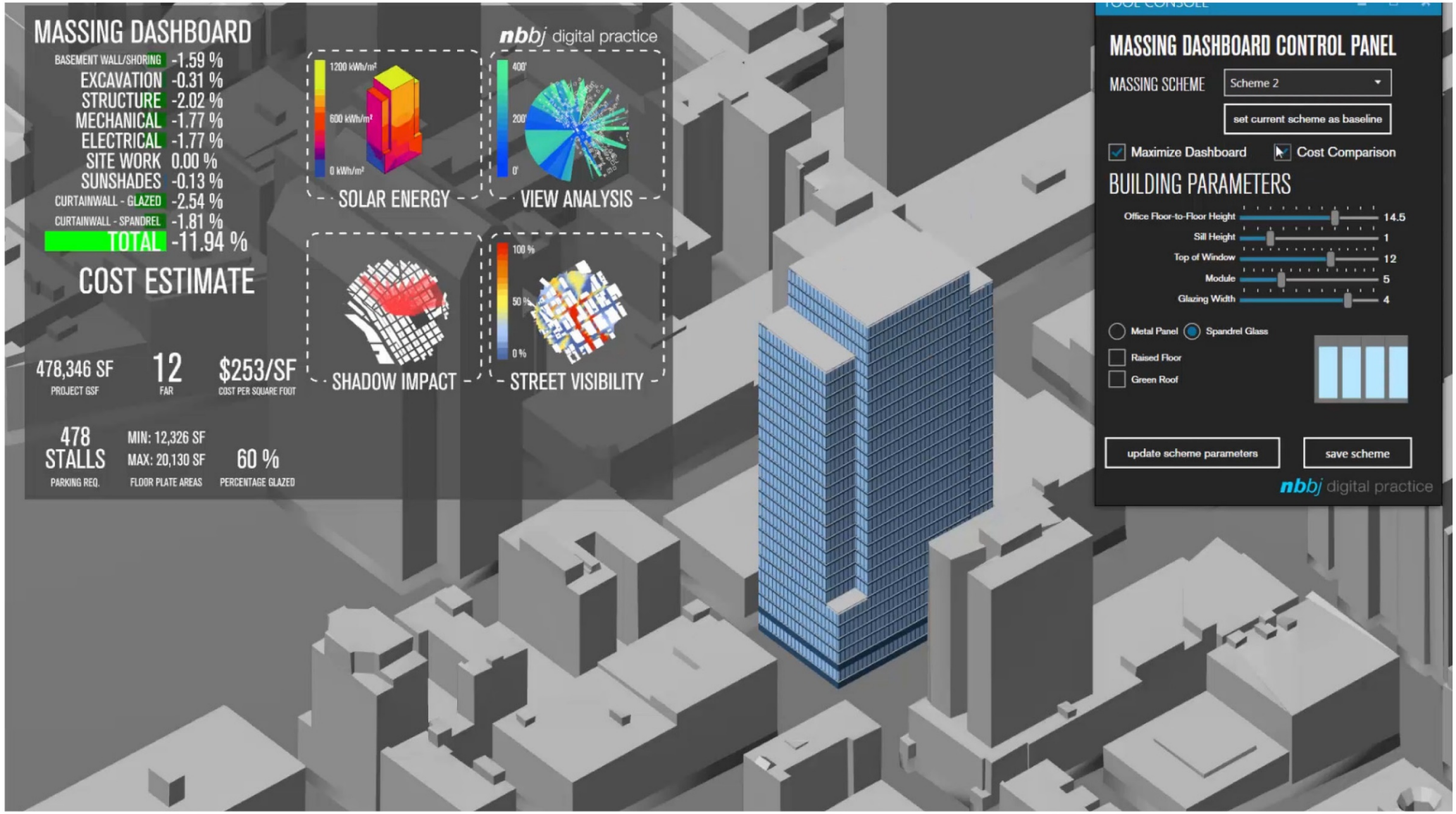

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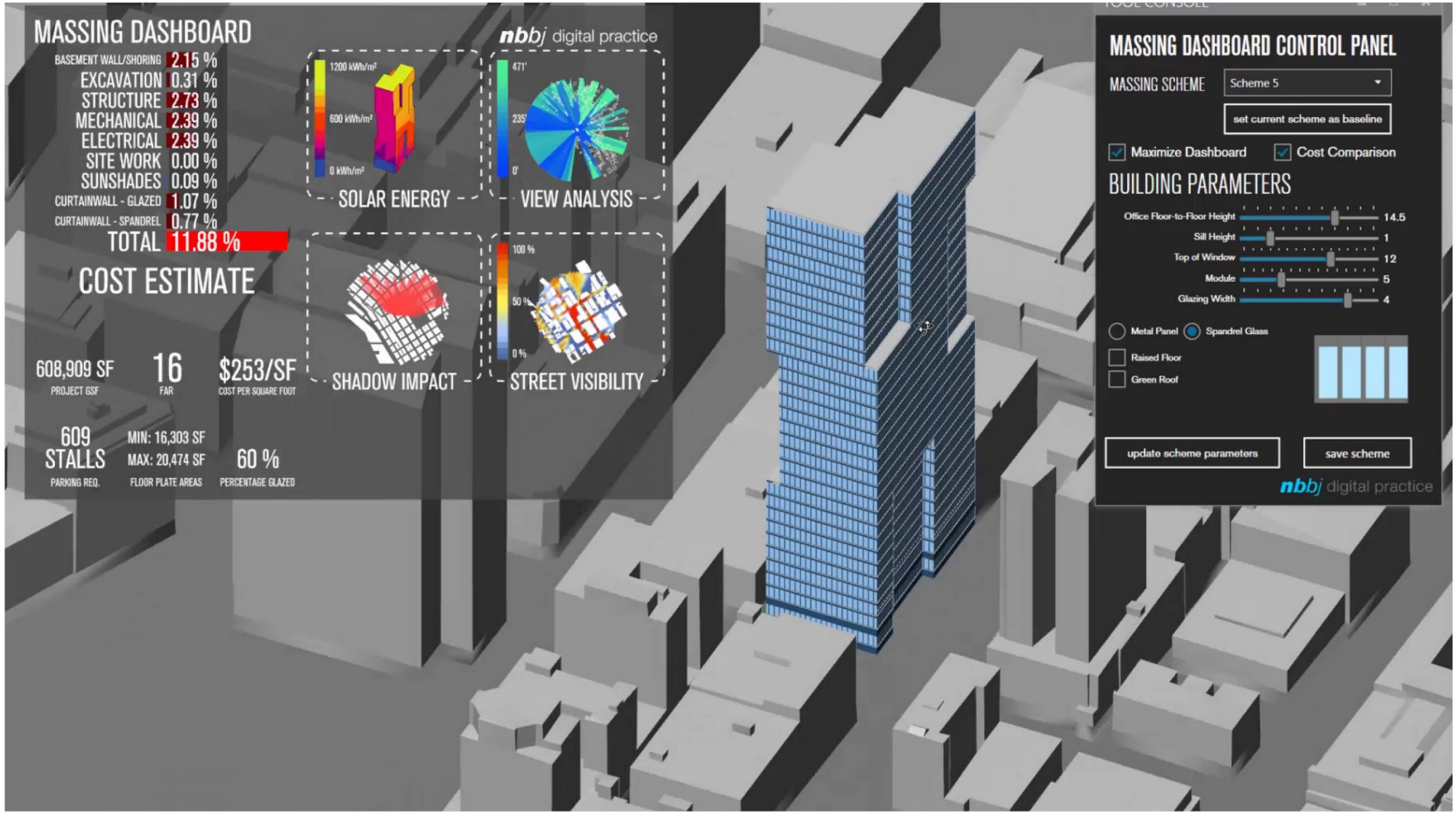

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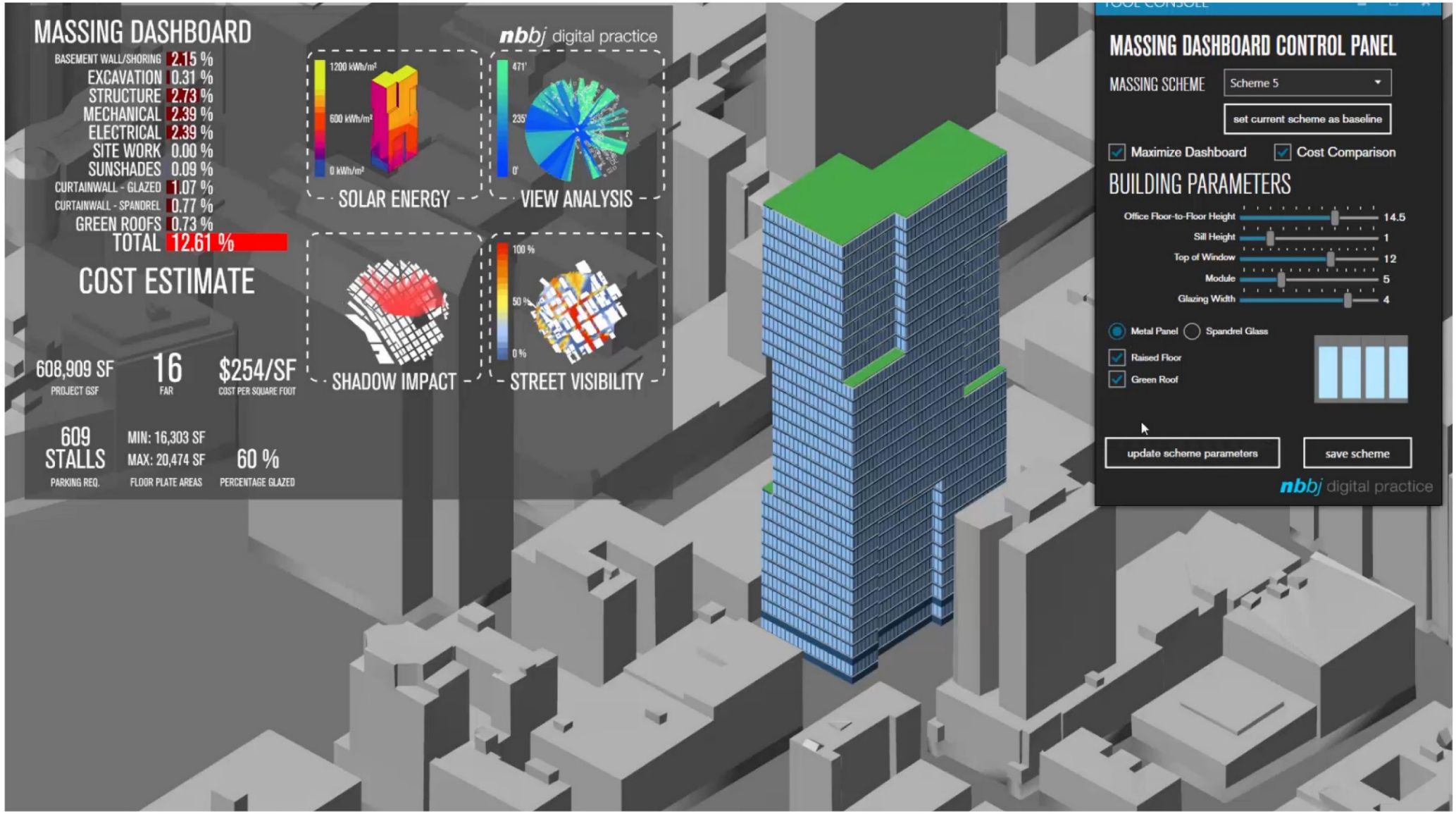

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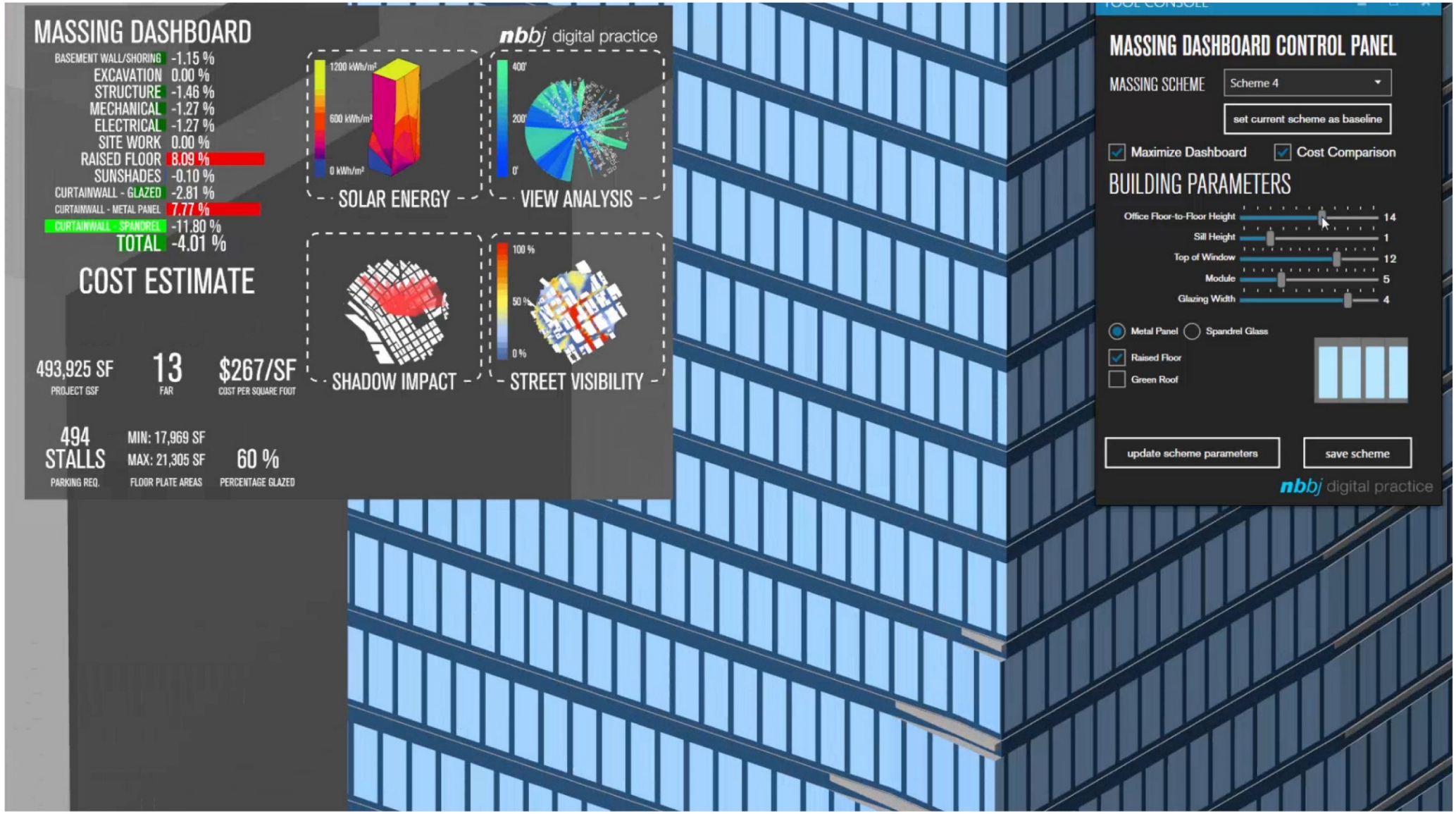

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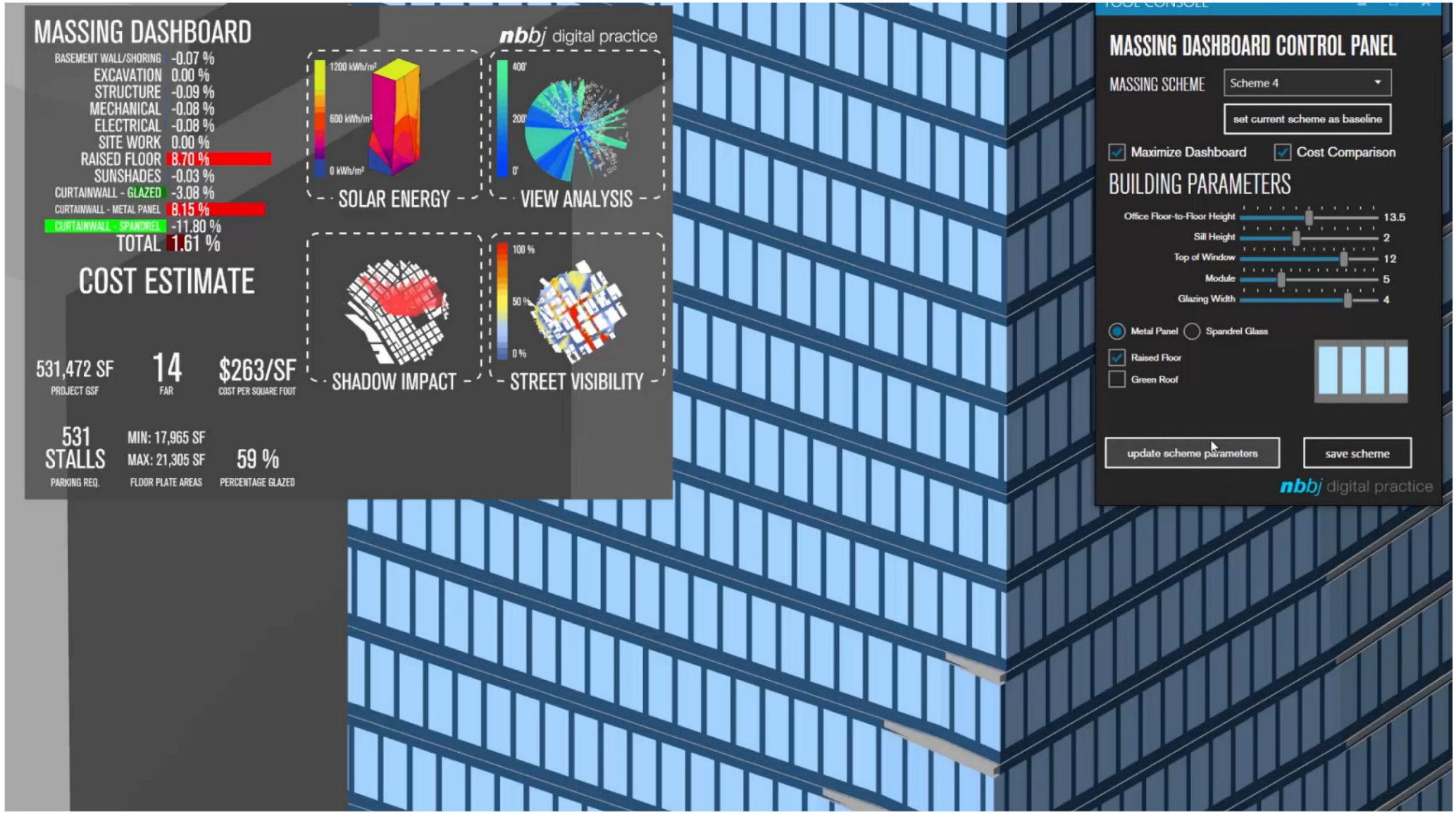

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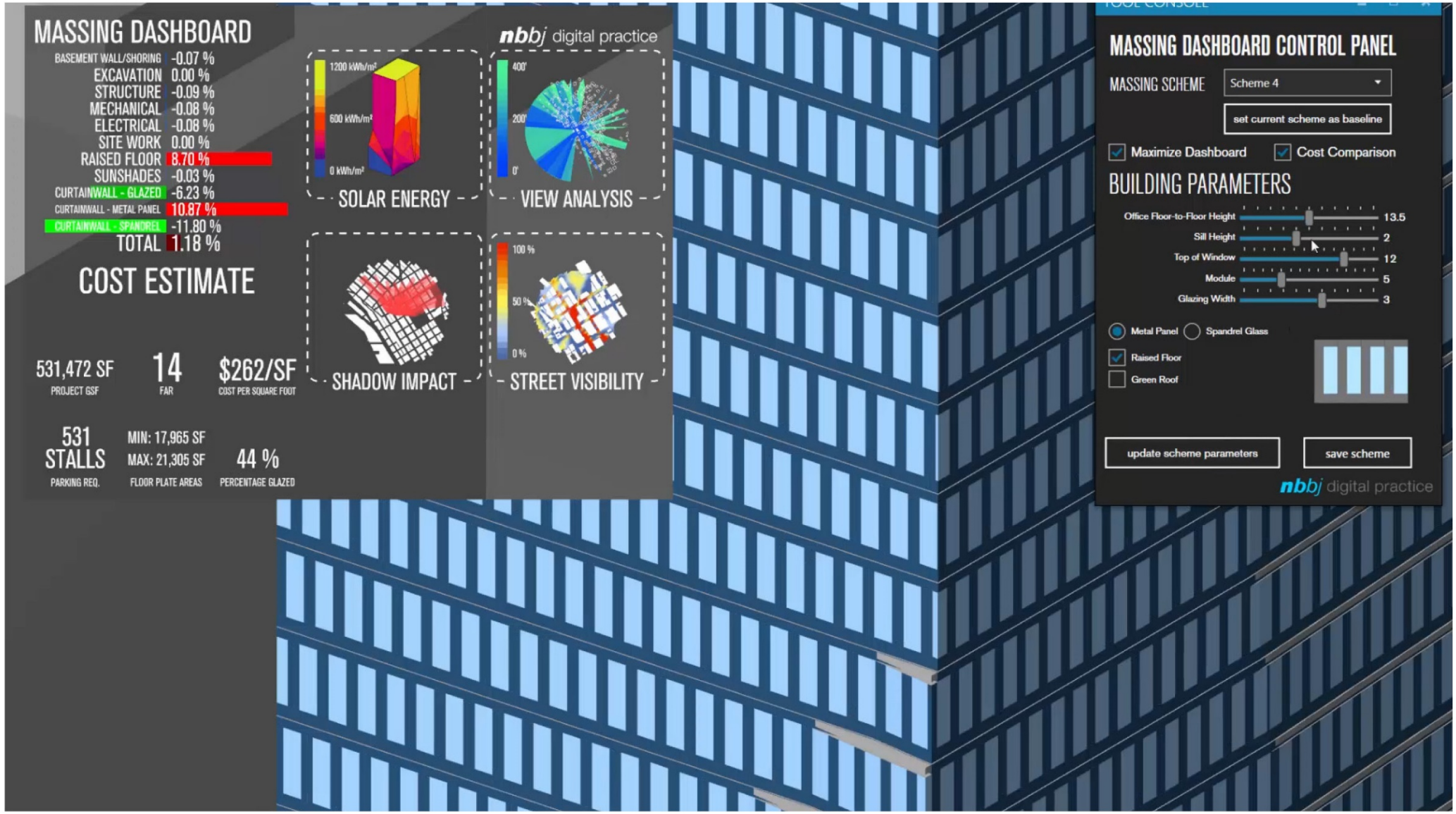
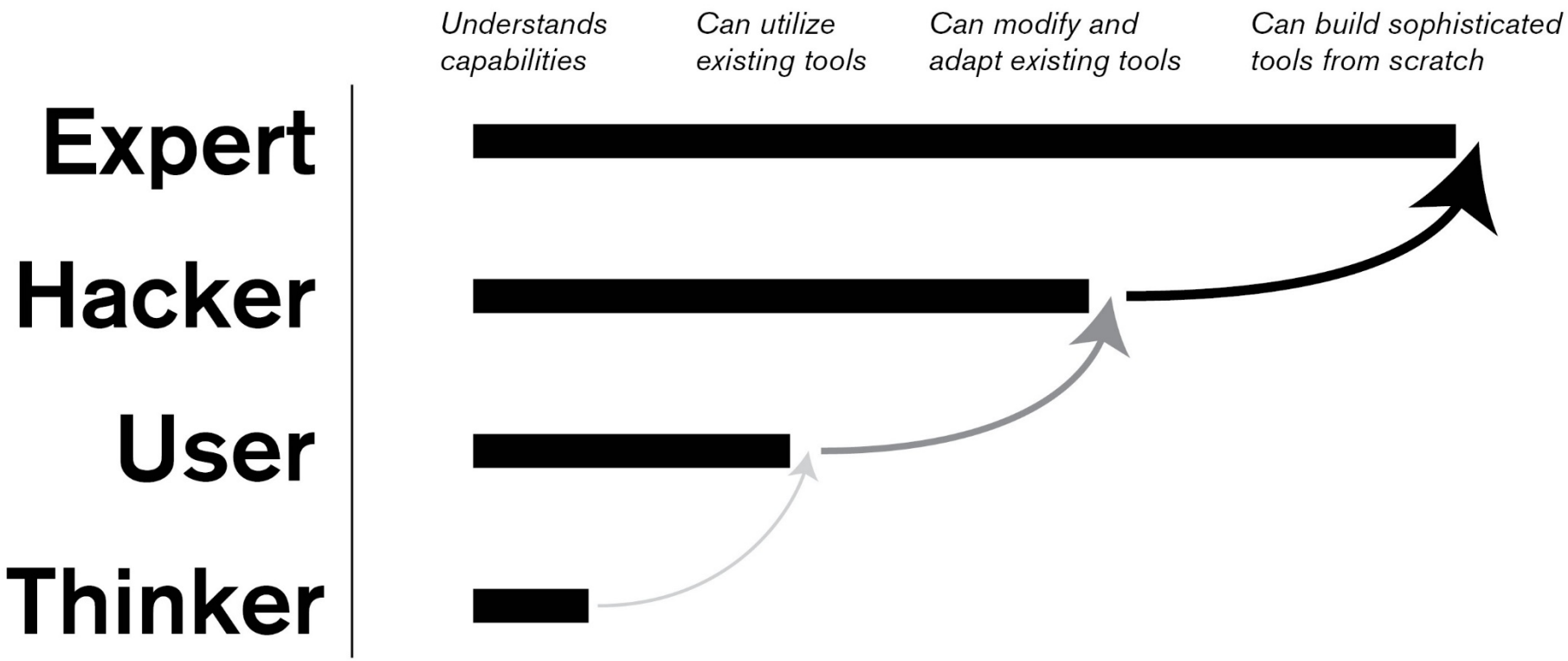
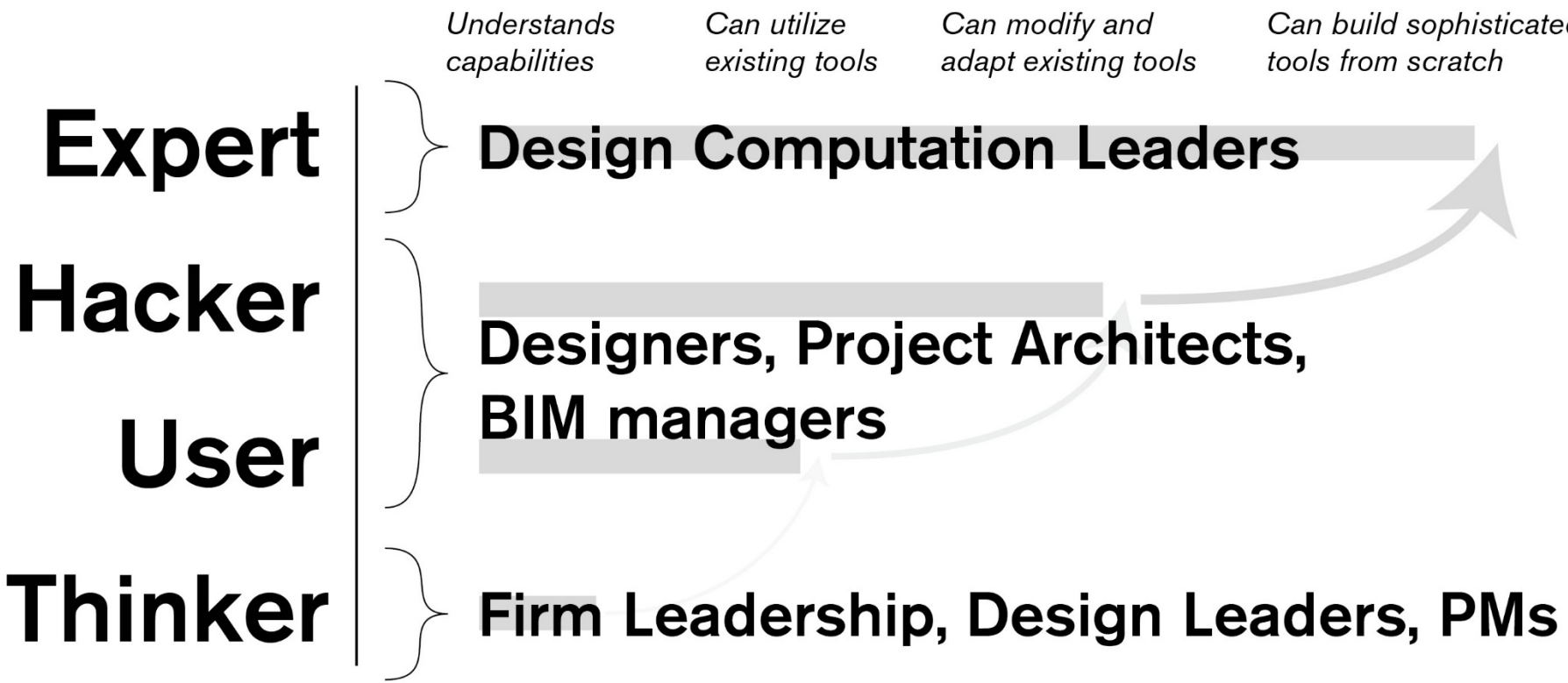


TRAIN EVERYONE!

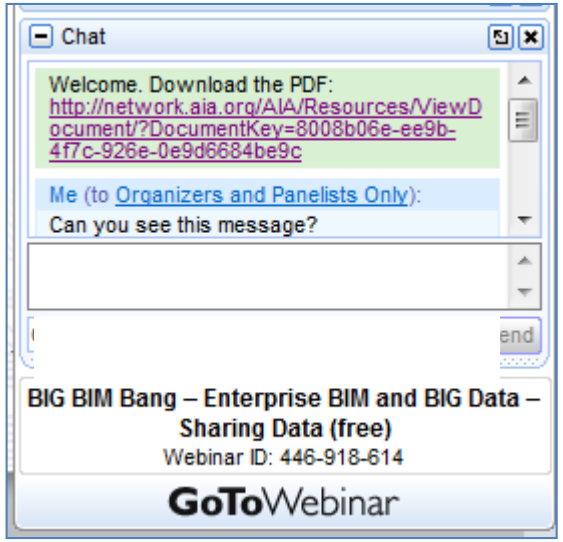


TRAIN EVERYONE!



Q&A Time

If you have questions for today's presenters, please submit them to the moderator via the chat box.



Content-related questions will be answered during this Q&A portion as time allows.

Thank you for joining us!

This concludes the AIA/CES Course **#TAP1502**. The webinar survey/report form URL is listed in the chat box ***and*** will be included in the follow-up email sent to you in the next hour.

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