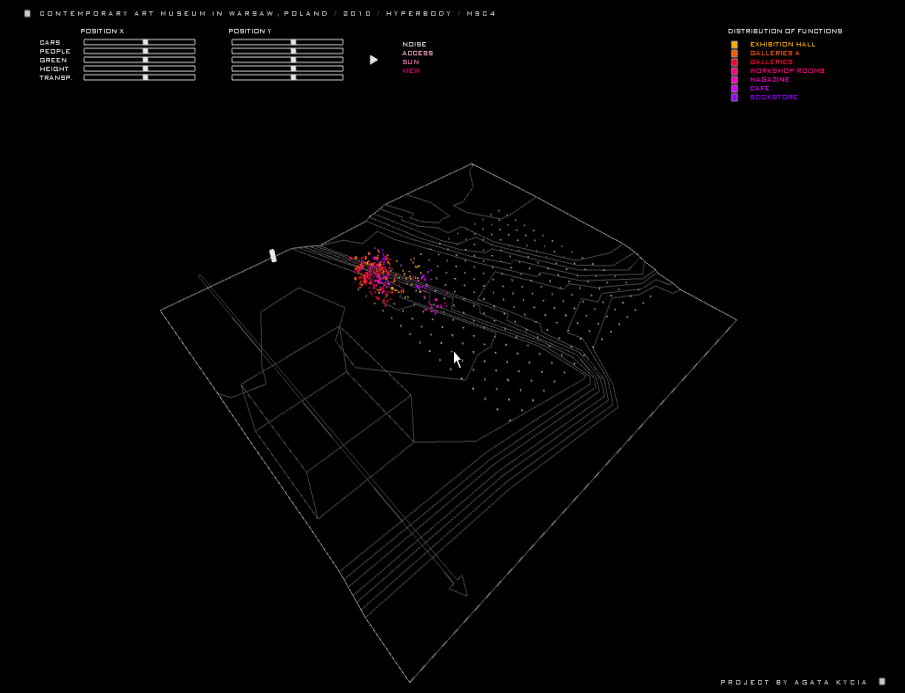
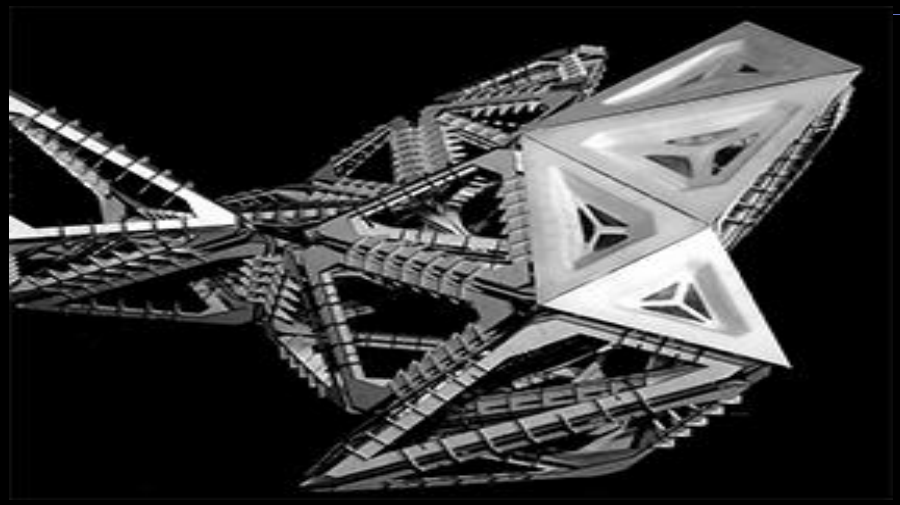
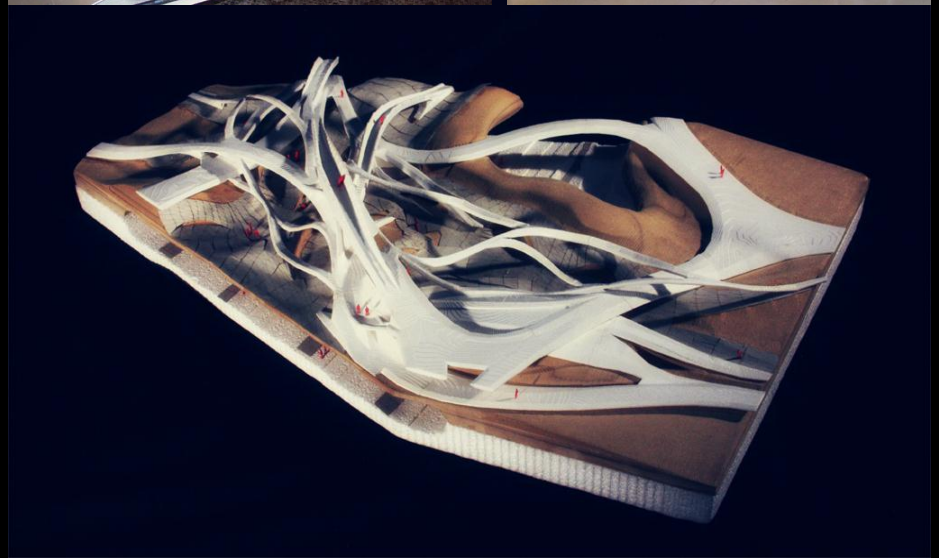
InfoMatters

Dr. Nimish Biloria
Asst. Prof, Hyperbody, TU Delft, The Netherlands.

HYPERBODY, TU Delft, The Netherlands





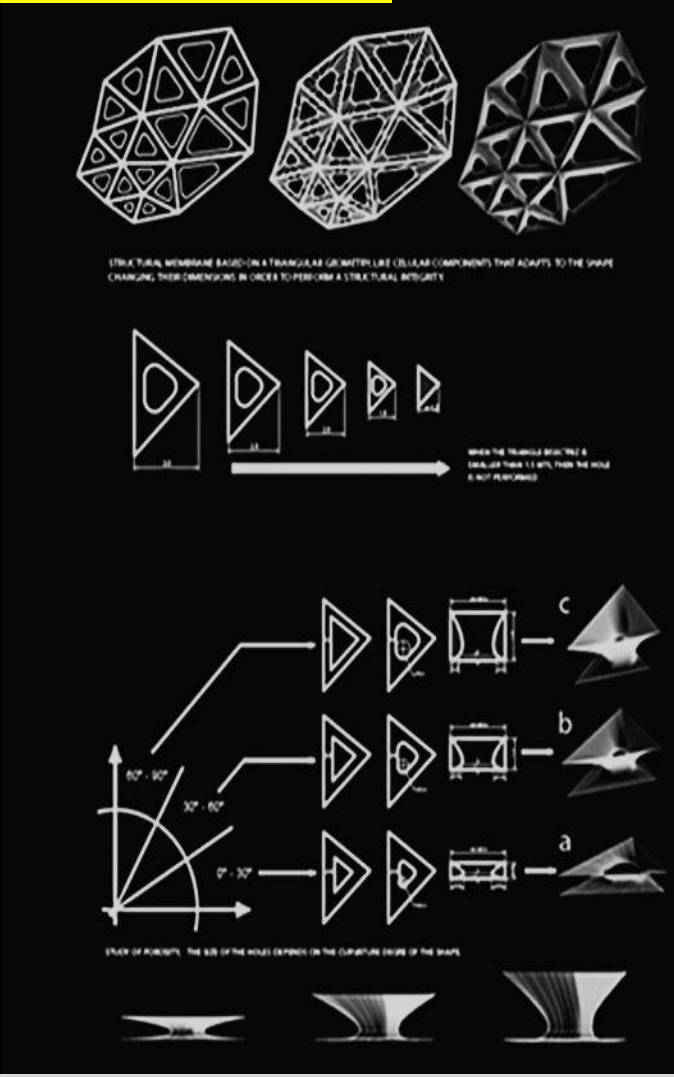


Natural Morphogenesis – Digital Morphogenesis

Material + Machine Computing

Simplicity – Complexity – Differentiation

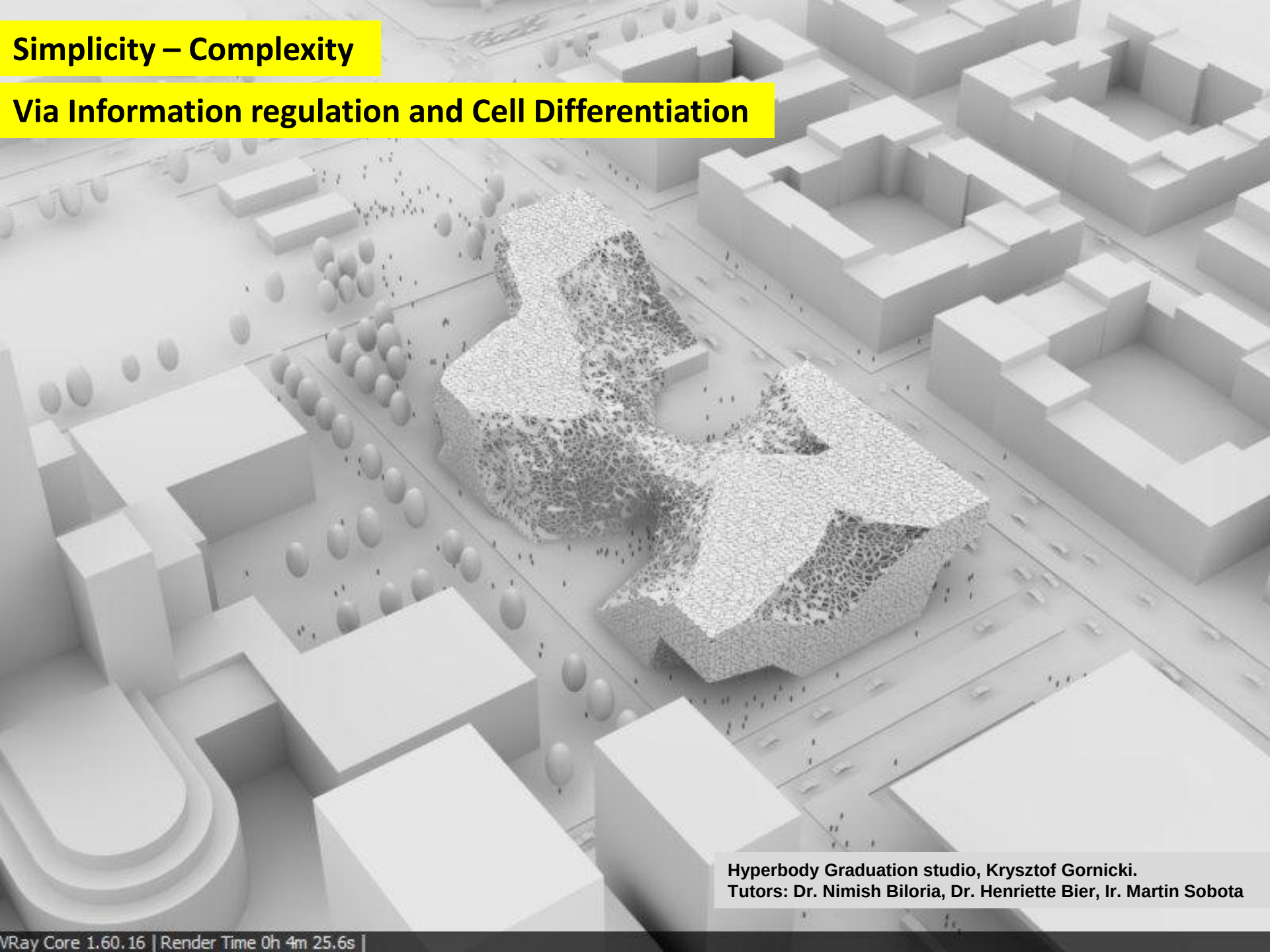
Variable density



1/20 CNC prototype. The differentiated system, made of parametrically modulated components, integrates structural, manufacturing and assembly logic. Anna Hartofili, Gabriel Moreno, Daniel Terán, Ma(s) Lab Design Studio (Jordi Truco and Marco Verde), EsArq-UiC Graduate school, 2008.

Simplicity – Complexity

Via Information regulation and Cell Differentiation



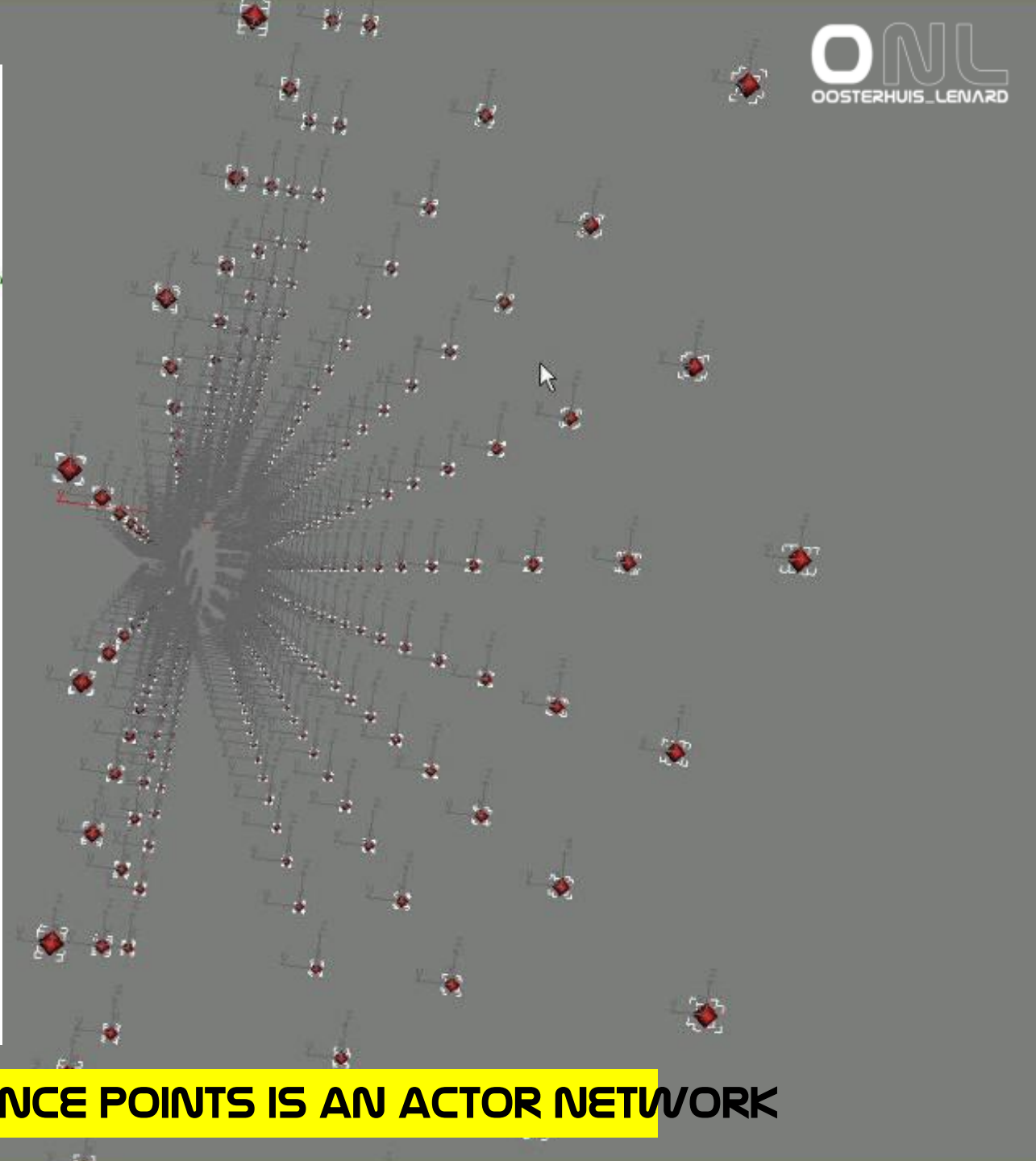
Hyperbody Graduation studio, Krysztof Gornicki.
Tutors: Dr. Nimish Biloria, Dr. Henriette Bier, Ir. Martin Sobota

Swarm Behavior

BUILDING COMPONENTS ARE ORGANIZED LIKE BIRDS IN A SWARM

Perspective

```
nrc=(ceil((k*2+ll+(h-1)*24)/2)+1) as integer
nrc-=1
c=nrc as string
if c.count==1 then c="0"+c

ss3.name="axis3Dglass"+c
updateshape ss3
l8.addnode ss3
ss3.wirecolor=l8.wirecolor
)

--5.5 builds closed splines into layer "p glassplates b

da2=(da^2+db^2-dc^2)/(2*da)
dh=sqrt(abs(db^2-da2^2))
np1=[0.0,0.0,0.0]
np2=[da,0.0,0.0]
np3=[da2,dh,0.0]
gp1=splineshape()
addnewspline gp1
addknot gp1 1 #corner #line np1
addknot gp1 1 #corner #line np2
addknot gp1 1 #corner #line np3
addknot gp1 1 #corner #line np1
close gp1 1
updateshape gp1
gp1.wirecolor=color 0 255 0
gp1.pos.x=b[2][1].pos.x+(k-1)*3500
gp1.pos.z=b[1][1].pos.z
move gp1 [0,(2000+1500*(g-1)),0]

la2=(la^2+lb^2-lc^2)/(2*la)
lh=sqrt(abs(lb^2-la2^2))
np2=[0.0,0.0,0.0]
np1=[la,0.0,0.0]
np3=[la2,-lh,0.0]
gp2=splineshape()
addnewspline gp2
addknot gp2 1 #corner #line np1
addknot gp2 1 #corner #line np2
addknot gp2 1 #corner #line np3
addknot gp2 1 #corner #line np1
close gp2 1
updateshape gp2
gp2.wirecolor=color 0 255 0
gp2.pos.x=b[2][1].pos.x+(k-1)*3500
gp2.pos.z=b[1][1].pos.z
move gp2 [0,(2500+1500*g),0]

if k!=1 then
(
da=distance b[g][k] bx[g][k-1]
dc=distance b[g][k] bx[g-1][k]
db=distance bx[g-1][k] bx[g][k-1]
la=distance b[g][k] bx[g][k-1]
```



ONL
OOSTERHUIS_LENARD

OINT CLOUD OF REFERENCE POINTS IS AN ACTOR NETWORK

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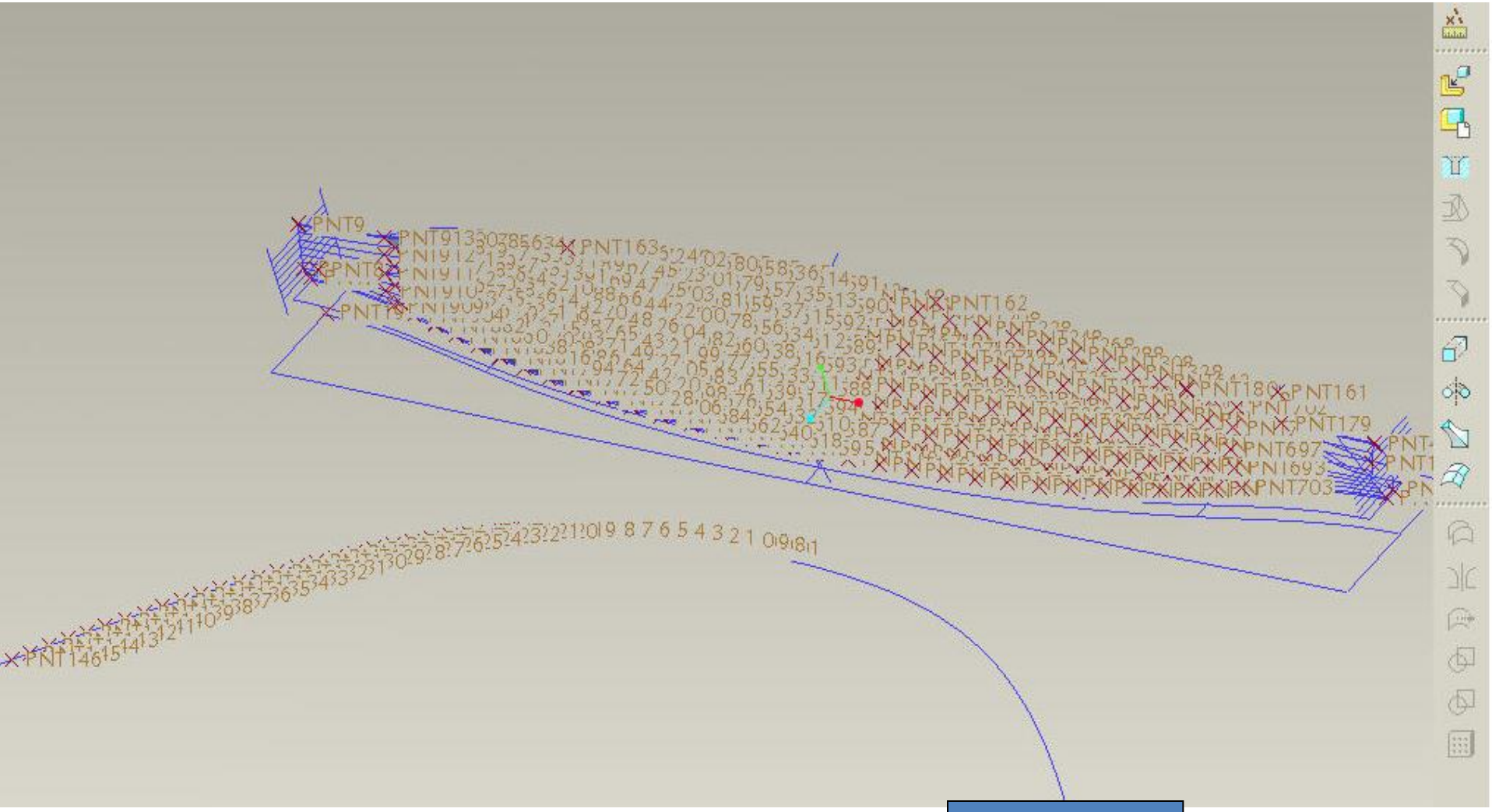
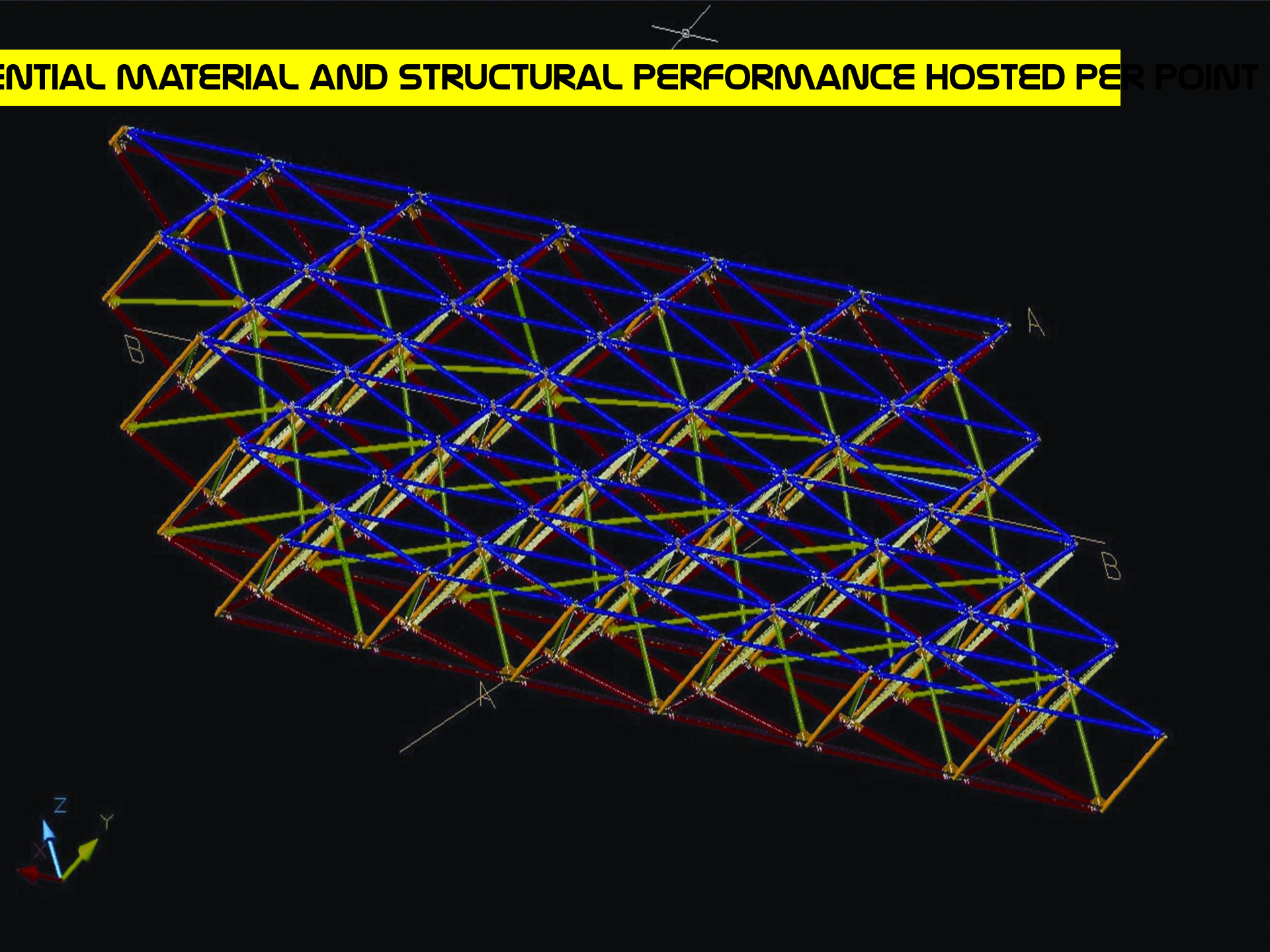


Data Base

7000-point objects, whose relations are administrated in a database.

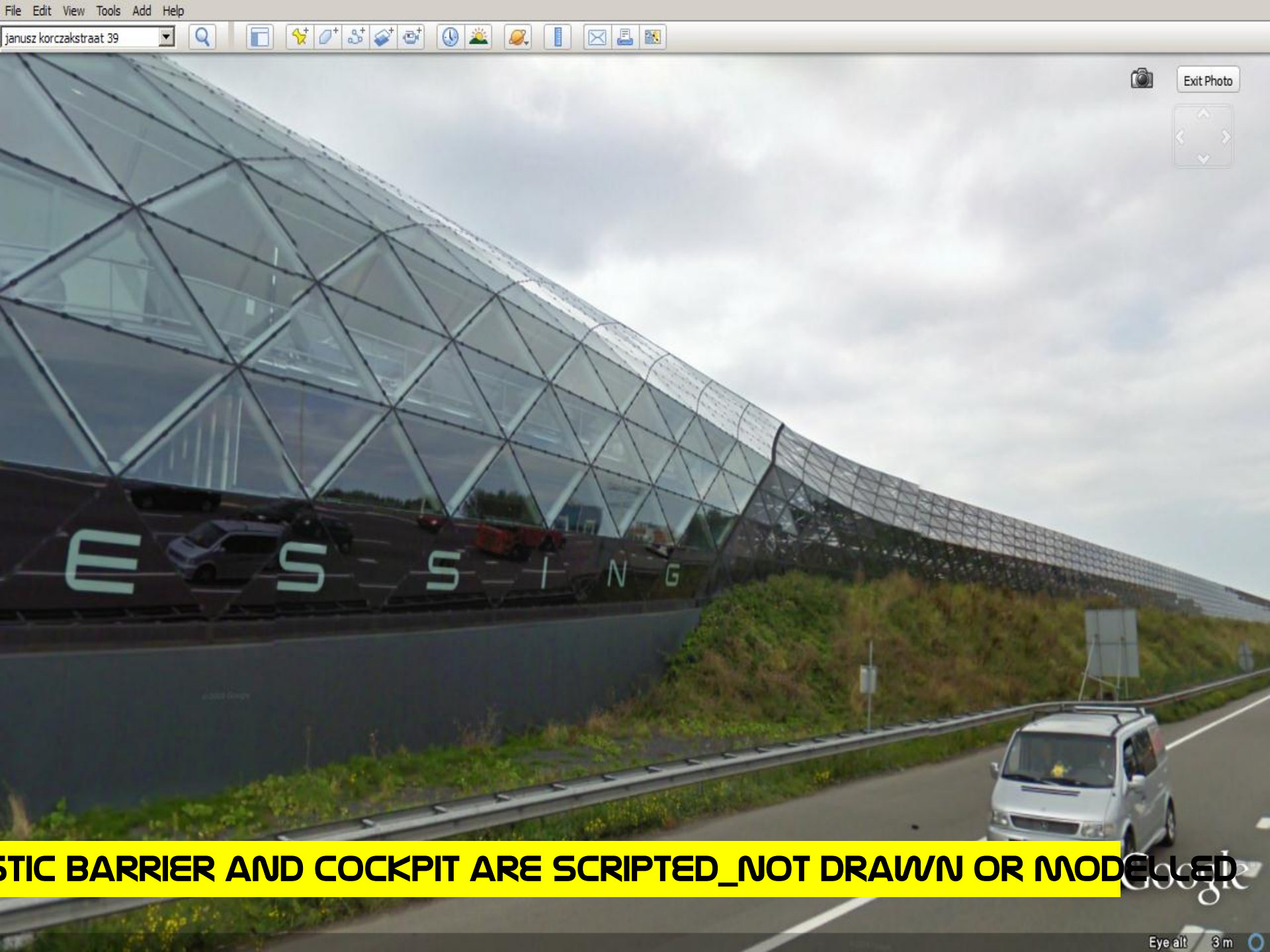
ENTIAL MATERIAL AND STRUCTURAL PERFORMANCE HOSTED PER POINT

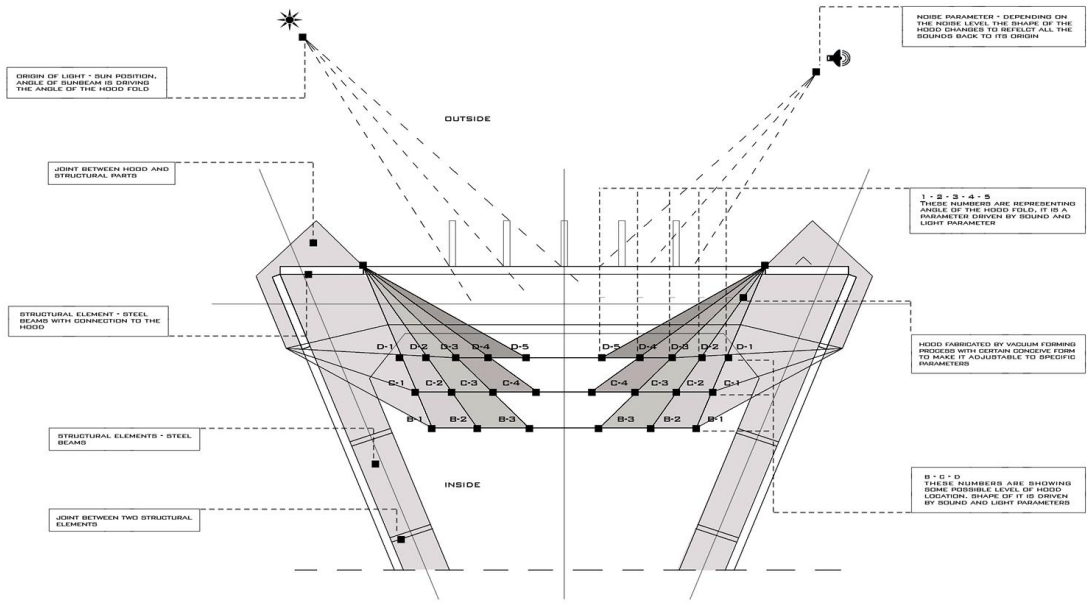


Parametric 3d digital data to mass customized production

Inlay photo: File to factory processing

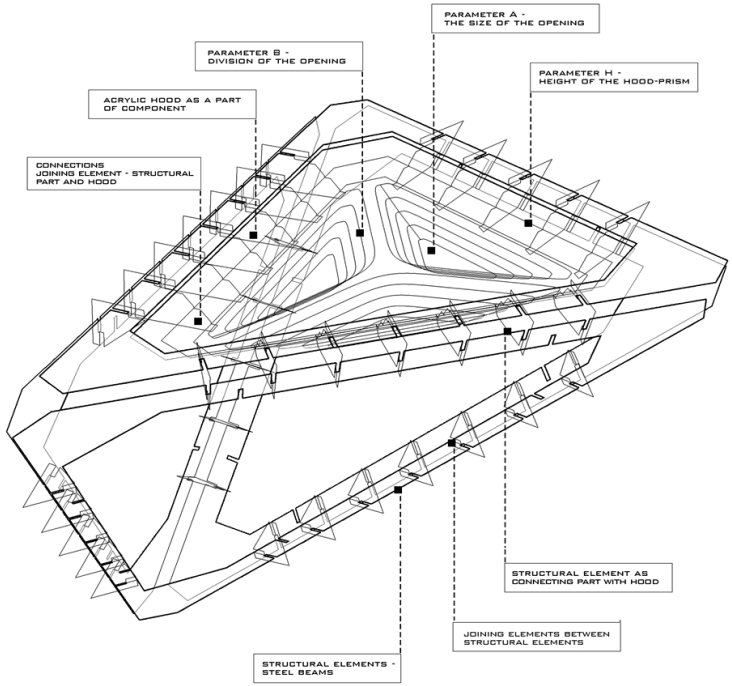
Acoustic Barrier – Netherlands, ONL

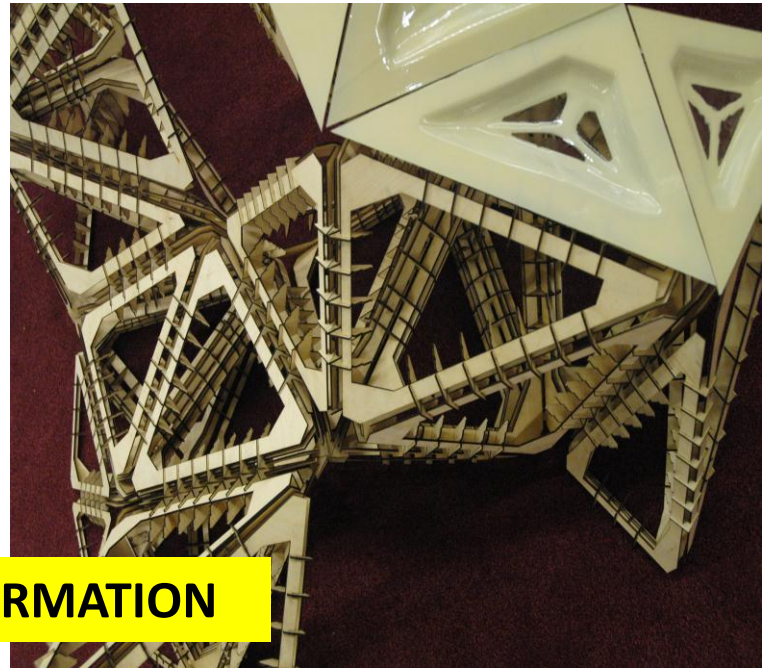

File Edit View Tools Add Help
janusz korczakstraat 39
Exit Photo
E S S I N G
STIC BARRIER AND COCKPIT ARE SCRIPTED_NOT DRAWN OR MODELLED
Google
Eye alt 3 m



AMMOUNT OF NOISE > AMMOUNT OF LIGHT AND TYPE OF LIGHT	25% TO REFLECT	50% TO REFLECT	75% TO REFLECT	100% TO REFLECT
DIRECT / 25%	>-5	>-4	0-4	1-3
INDIRECT / 50%	-3	-2	>-2	>-2
DIRECT / 50%	>-3	-3	>-2	>-2
INDIRECT / 75%	2	3	1	1

3D VIEW OF THE COMPONENT WITH ITS MAIN FEATURES



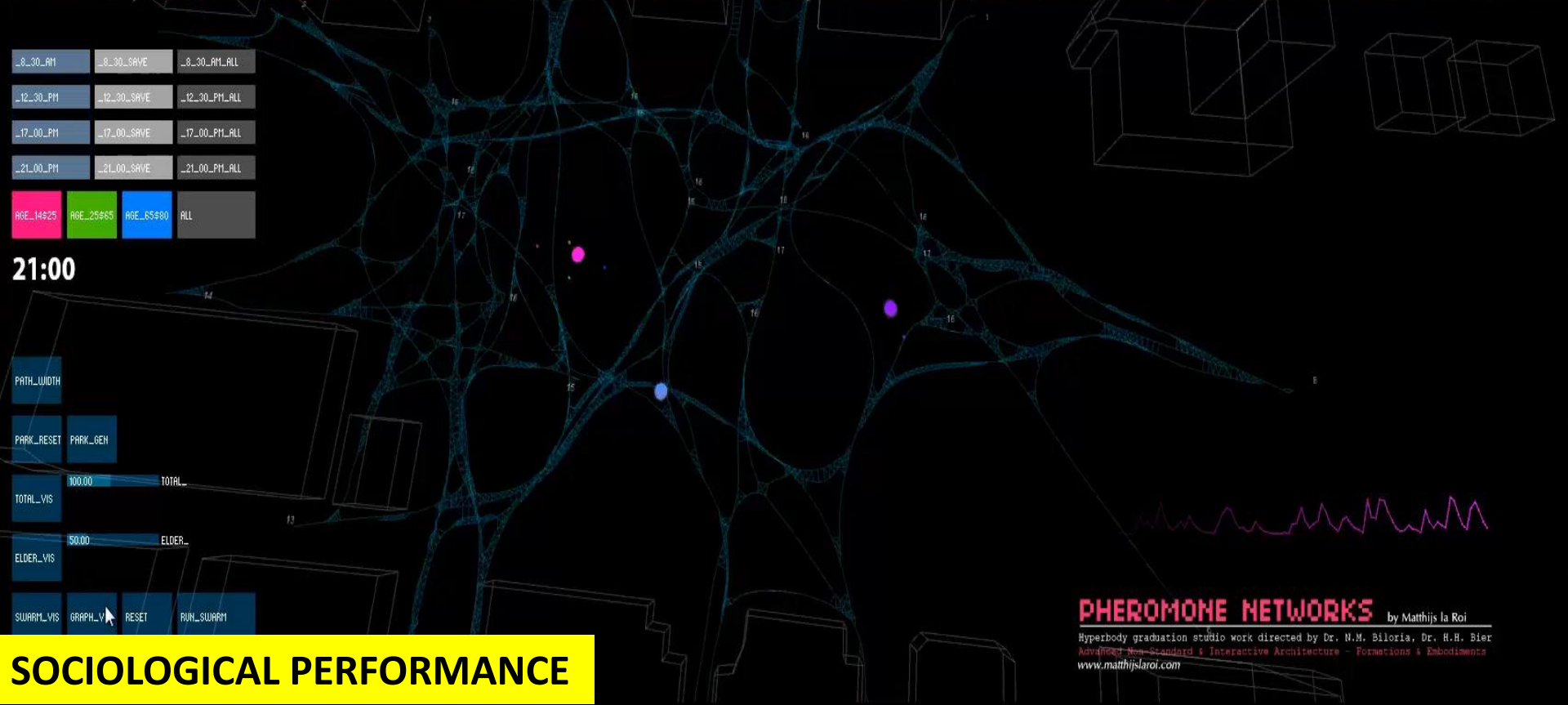


ASSOCIATIVE MODELING BASED PERFORMATIVE FORMATION

2013
CLIMBING WALL
AMSTERDAM
OOSTERHUIS_LENARD
THE SWARM OF BUILDING COMPONENTS IS SELF-
SUPPORTING

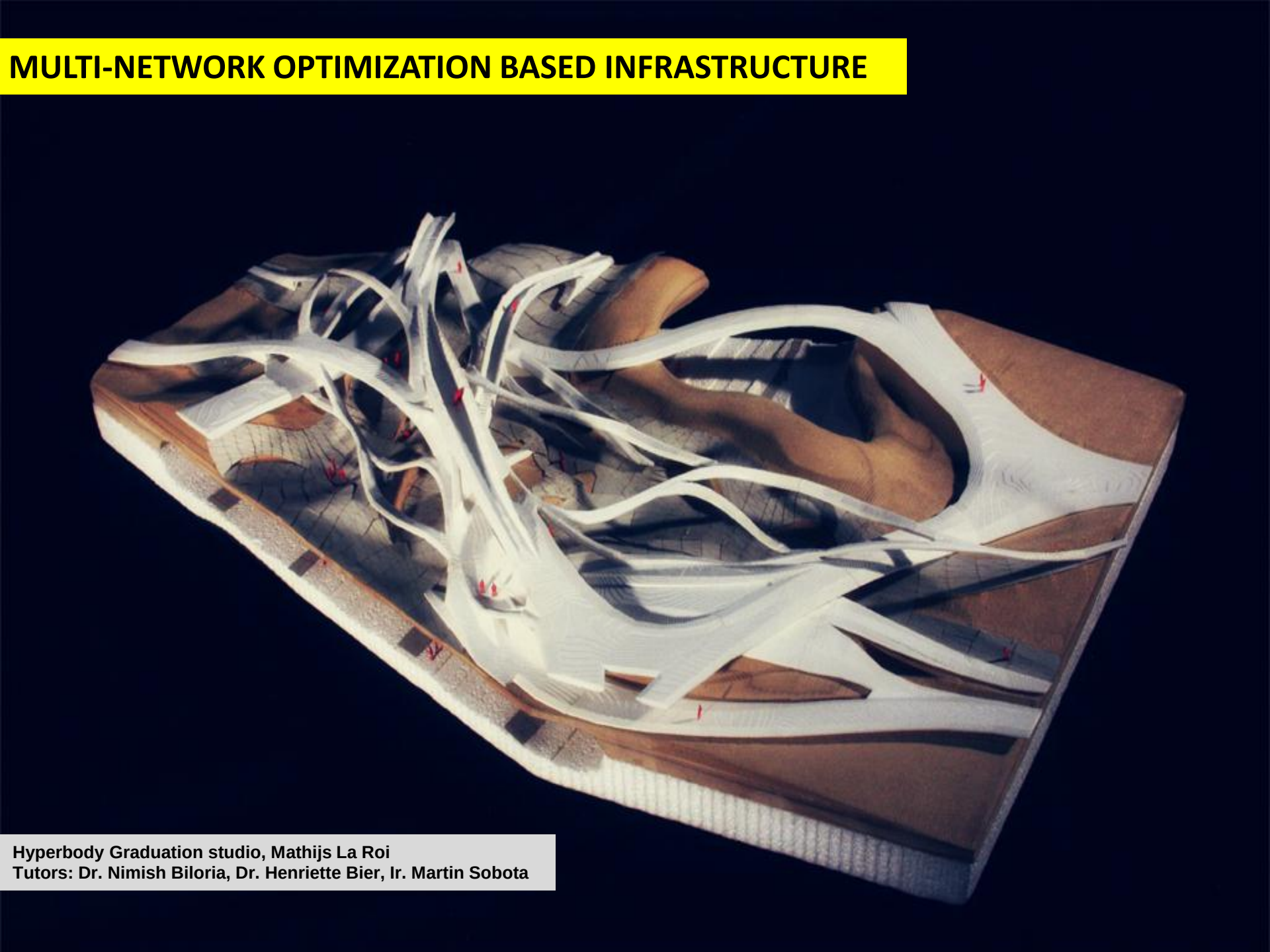
AGENT BASED MODELING

	_1_1	_2_1	_3_1	_4_1	_5_1	_6_1	_7_1	_8_1	_9_1	_10_1	_11_1	_12_1	_13_1	_14_1	_15_1	_16_1	_17_1	_18_1	_19_1	_20_1	_21_1	_22_1	_23_1	_24_1
SPOORDREEF	0.00	0.00	0.00	0.00	2.57	0.00	0.00	0.00	0.85	1.71	2.85	1.57	0.00	3.28	2.71	3.42	2.00	2.28	0.85	0.28	1.14	2.00	1.28	0.00
PJ_OUDWEG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	1.42	1.42	1.57	0.00	1.85	1.71	2.42	2.14	1.85	0.28	0.00	0.00	0.85	2.00	0.00
MAJESTIC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85	2.28	0.85	1.57	0.00	1.71	1.42	1.14	2.00	1.71	0.85	0.00	0.00	0.71	1.85	0.00
WJSGR_BH_H	0.00	0.00	0.00	0.00	2.57	0.00	0.00	0.00	2.57	5.00	5.00	5.00	0.00	3.57	3.57	3.28	2.85	1.42	0.71	0.00	0.00	2.57	1.71	0.00
MANDELA_PAD	0.00	0.00	0.00	0.85	0.00	0.00	0.00	1.28	1.71	5.00	5.00	2.71	1.85	5.00	4.71	4.00	3.00	3.57	1.42	0.71	1.57	5.00	1.42	0.00
MARTINEZ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	3.28	0.85	1.28	0.00	1.71	1.42	1.57	2.14	1.57	1.00	0.00	0.00	0.71	1.57	0.00
LANDHARSTDR	0.00	0.00	0.00	0.00	0.00	0.00	2.57	1.14	1.85	5.00	4.85	1.57	1.85	5.00	5.00	5.00	5.00	5.00	1.71	0.71	0.00	5.00	1.28	0.00
SPOOREN_PD	0.00	0.00	0.00	1.28	0.00	1.57	0.00	0.00	0.00	0.00	0.00	0.00	0.85	1.14	2.71	2.28	1.71	2.71	0.28	0.71	1.14	5.00	0.00	0.00
FESTIVAL_PLH	0.00	0.00	0.00	0.42	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	1.42	2.28	0.57	0.00	1.00	2.28	0.00	0.00
REGISSR_STR	1.28	1.14	1.57	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.28	1.42	1.28	0.42	0.00	0.00	4.42	0.00	0.00
STATION_STR	4.00	3.42	2.57	5.00	4.00	0.71	5.00	0.85	1.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WJSGR_BH_Z	4.00	1.71	1.71	4.85	2.42	1.00	4.28	0.71	1.14	0.00	0.00	0.00	1.85	5.00	4.00	5.00	4.85	2.71	1.42	0.00	0.00	5.00	5.00	0.00
SCHOUTSTAT	0.00	0.00	0.42	1.57	0.00	2.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.42	1.14	1.14	0.71	1.42	0.85	0.85	1.00	2.28	0.00	0.00
SPOORB_PD_W	0.00	0.00	0.00	1.00	0.00	1.14	0.85	0.00	0.00	0.00	0.00	0.00	0.00	2.42	0.42	0.28	0.57	0.42	0.71	1.42	1.42	2.57	0.00	0.00
BUS_PLATFRM	4.00	4.57	3.57	4.85	4.85	3.71	3.85	2.57	0.28	5.00	5.00	4.57	0.42	5.00	5.00	5.00	5.00	5.00	2.28	3.28	1.14	2.14	2.14	0.00
TRN_PLATFRM1	5.00	4.42	3.71	5.00	5.00	3.42	5.00	1.14	0.00	5.00	5.00	5.00	1.42	5.00	5.00	5.00	5.00	5.00	2.85	3.00	1.28	2.14	3.00	0.00
TRN_PLATFRM2	4.28	4.57	3.71	5.00	5.00	3.28	5.00	1.14	1.28	0.28	5.00	5.00	2.42	5.00	5.00	5.00	5.00	5.00	2.28	2.57	1.14	1.28	2.71	0.00
TRN_PLATFRM3	4.57	3.42	4.85	5.00	5.00	1.42	5.00	1.42	1.71	0.85	5.00	5.00	2.28	5.00	5.00	5.00	5.00	5.00	2.71	3.14	0.00	2.28	2.71	0.00
TRN_PLATFRM4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	5.00	5.00	0.85	0.71	0.00	1.28	0.00	0.00
AUDITORIUM	0.00	0.42	0.42	0.85	0.71	0.00	0.71	0.42	0.85	1.00	1.57	0.00	0.00	1.71	3.14	2.85	2.42	3.14	0.00	0.00	0.00	0.00	0.00	0.00
ART_CINEMA	1.57	0.00	0.00	5.00	5.00	2.28	4.71	5.00	1.71	5.00	5.00	3.14	0.85	3.14	0.57	0.42	1.28	0.57	0.00	0.00	0.00	0.00	0.00	0.00
COMM_CNTR	0.00	0.00	0.00	2.42	3.14	4.71	5.00	0.00	0.00	4.85	5.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUPERMARKET	4.85	2.00	1.42	3.14	5.00	5.23	1.28	5.00	3.57	2.00	5.00	2.42	2.14	3.00	2.00	1.85	2.00	2.28	1.28	0.00	0.00	0.00	0.00	0.00
HOTEL	3.14	2.28	1.42	1.14	3.42	1.28	3.85	0.00	0.71	0.00	0.00	0.00	0.42	1.85	2.57	2.14	2.85	0.42	0.00	0.00	0.00	0.00	0.00	0.00



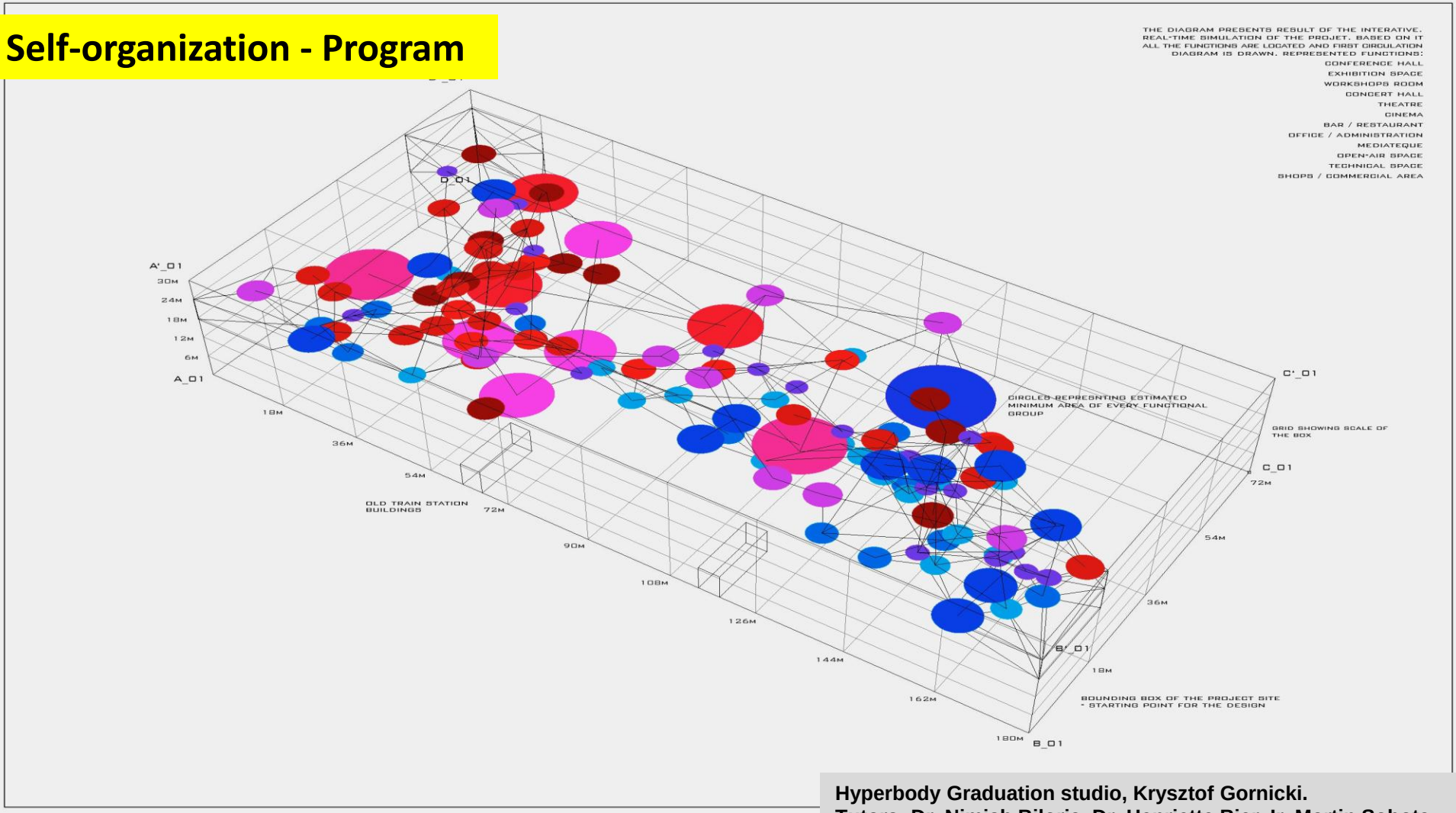
SOCIOLOGICAL PERFORMANCE

MULTI-NETWORK OPTIMIZATION BASED INFRASTRUCTURE

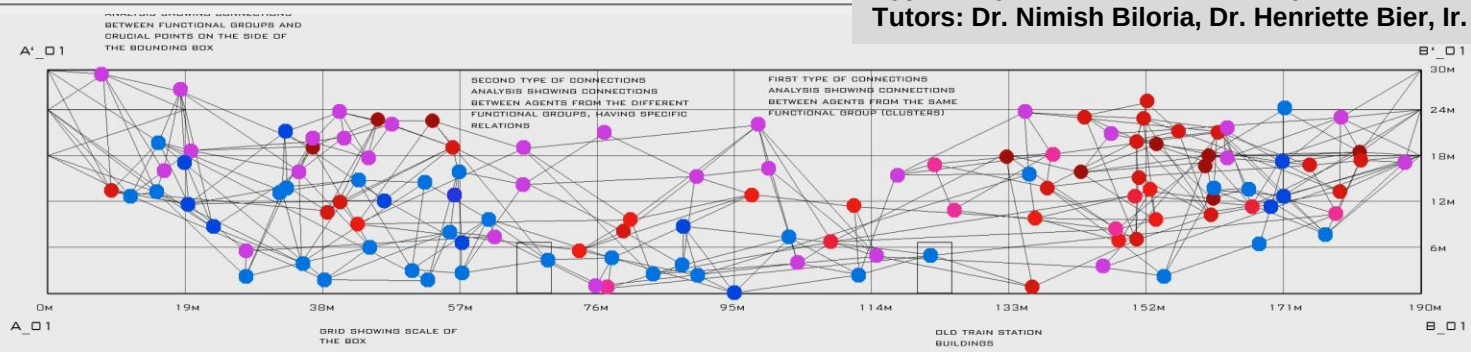


Hyperbody Graduation studio, Mathijs La Roi
Tutors: Dr. Nimish Biloria, Dr. Henriette Bier, Ir. Martin Sobota

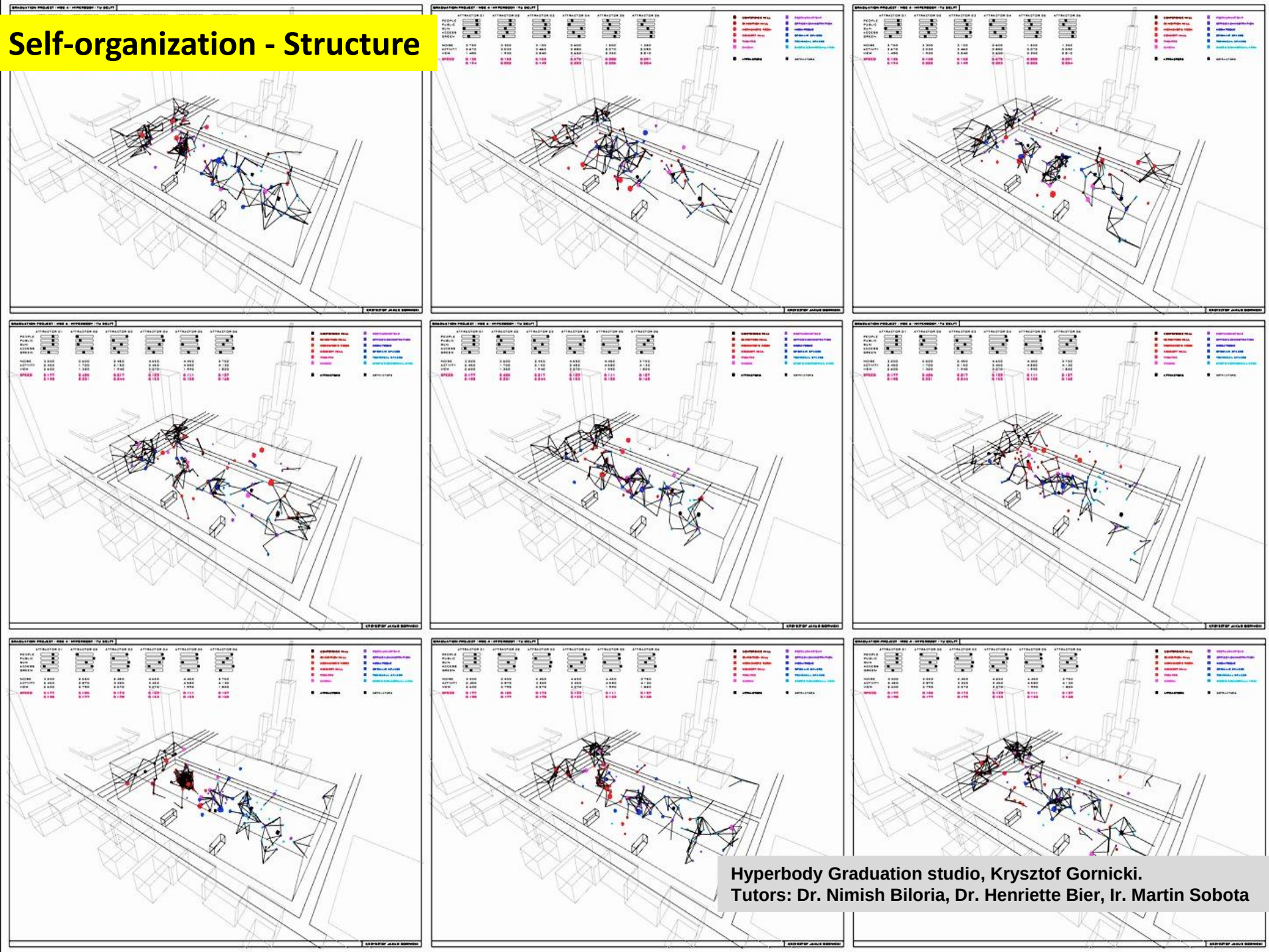
Self-organization - Program



Hyperbody Graduation studio, Krysztof Gornicki.
Tutors: Dr. Nimish Biloria, Dr. Henriette Bier, Ir. Martin Sobota



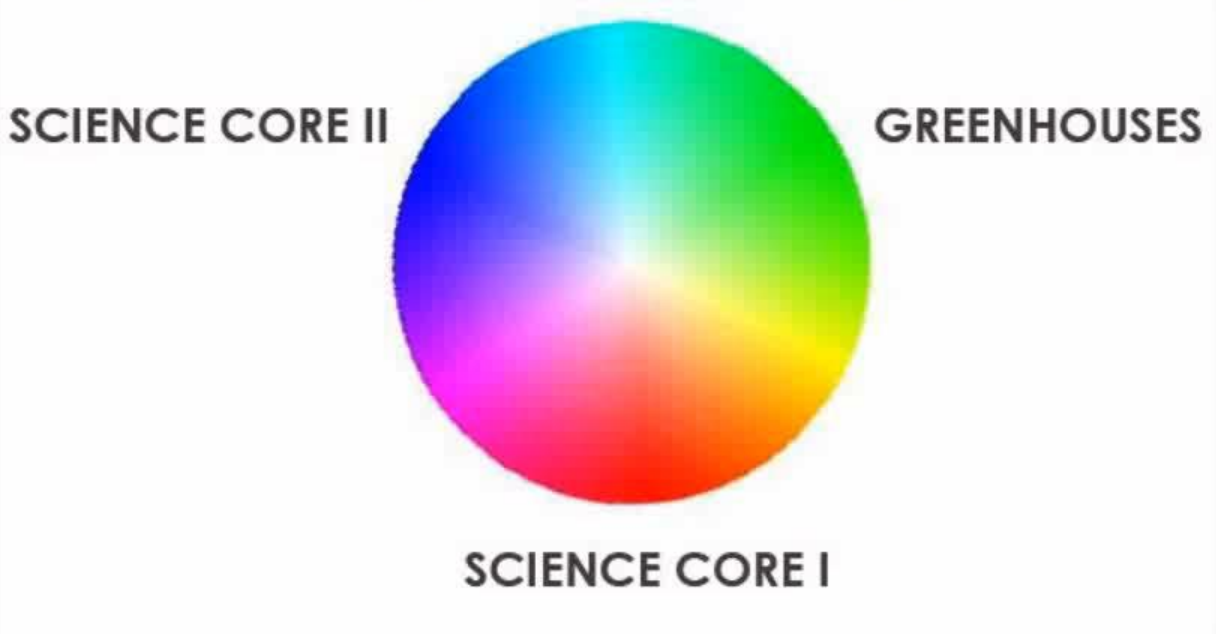
Self-organization - Structure

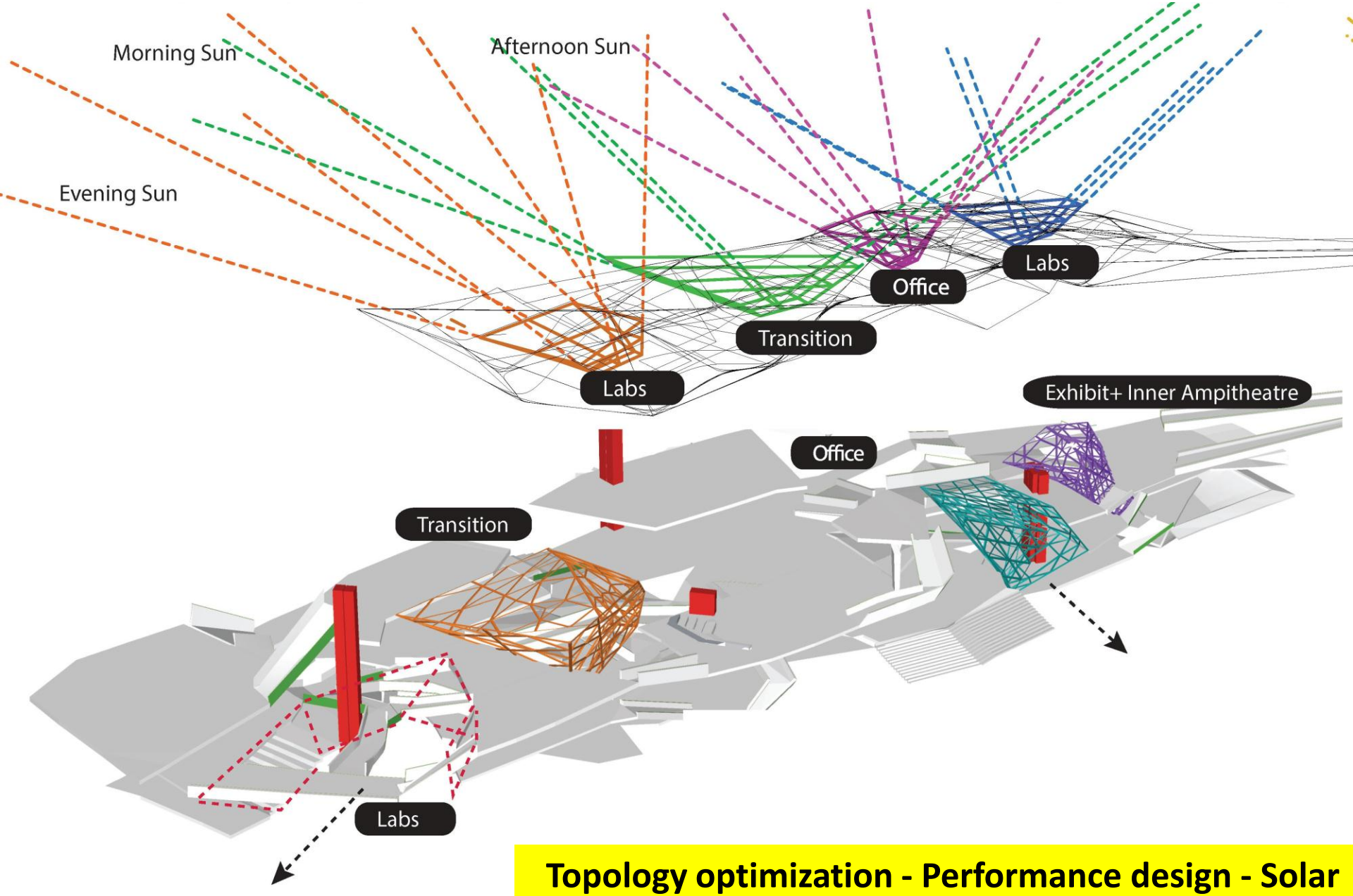


Hyperbody Graduation studio, Krysztof Gornicki.
Tutors: Dr. Nimish Biloria, Dr. Henriette Bier, Ir. Martin Sobota

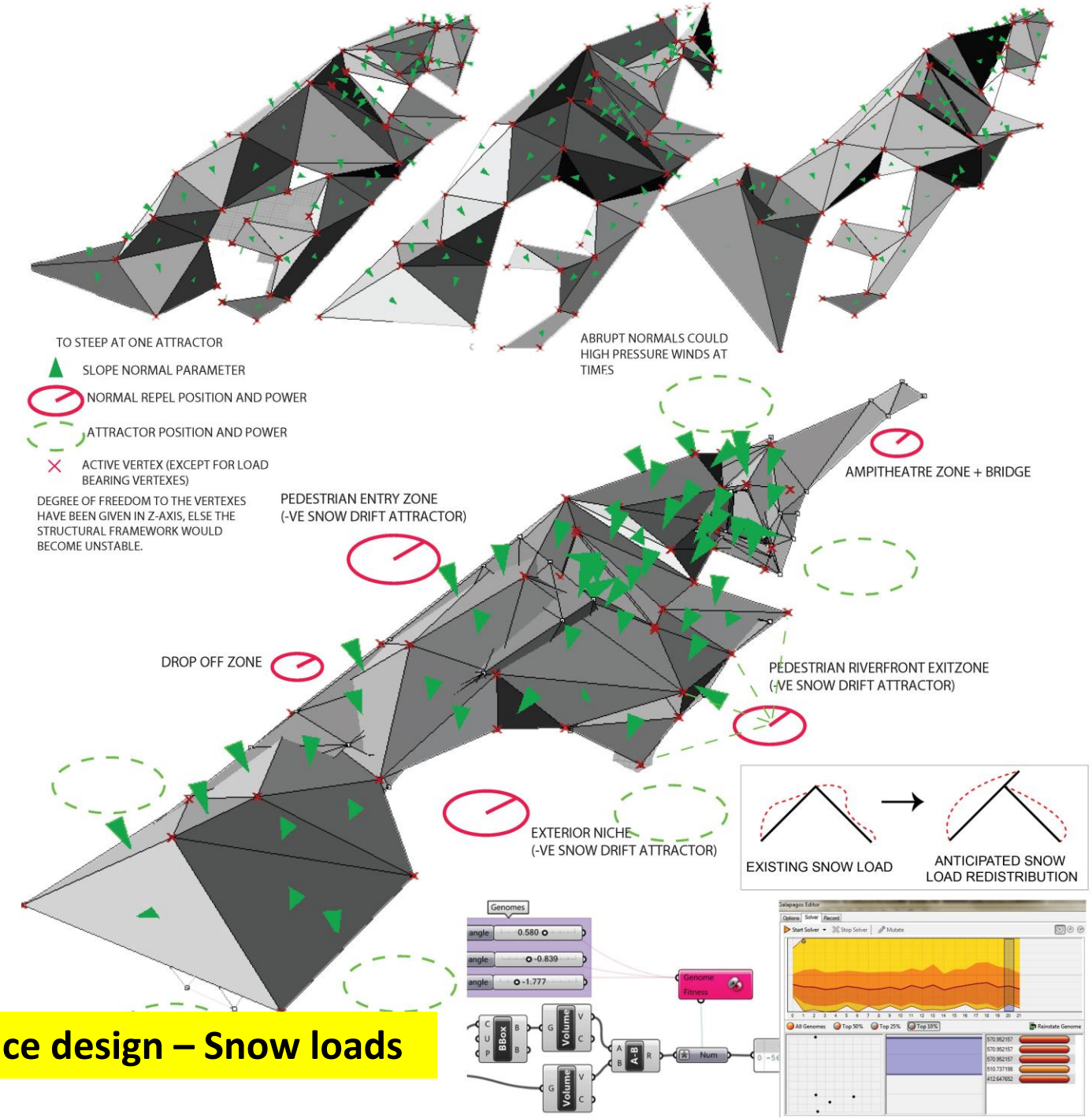
MULTI-OPTIMIZATION BASED LOCAL PROGRAM FORMATION

PROGRAMMATIC DISPERSION
SELF ORGANIZATION SIMULATION
(SPRING PHYSICS)

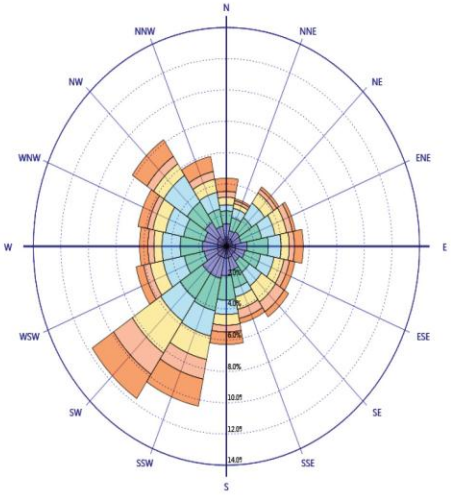


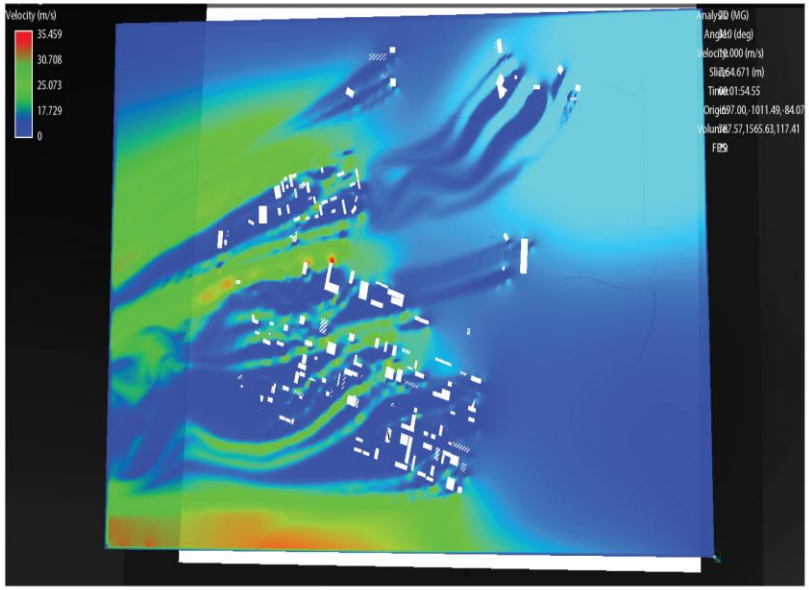


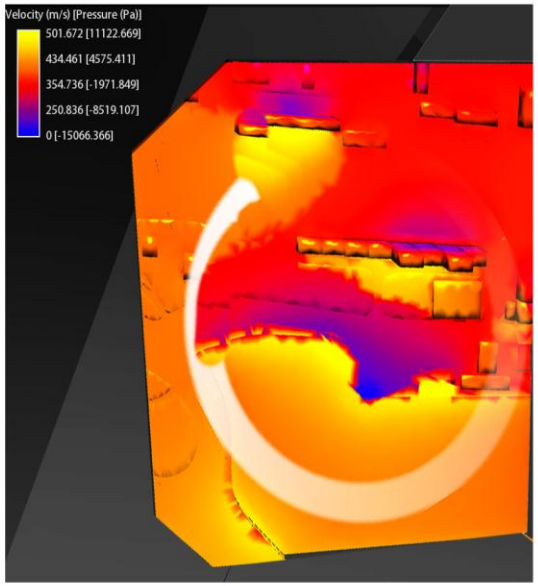
Topology optimization - Performance design - Solar

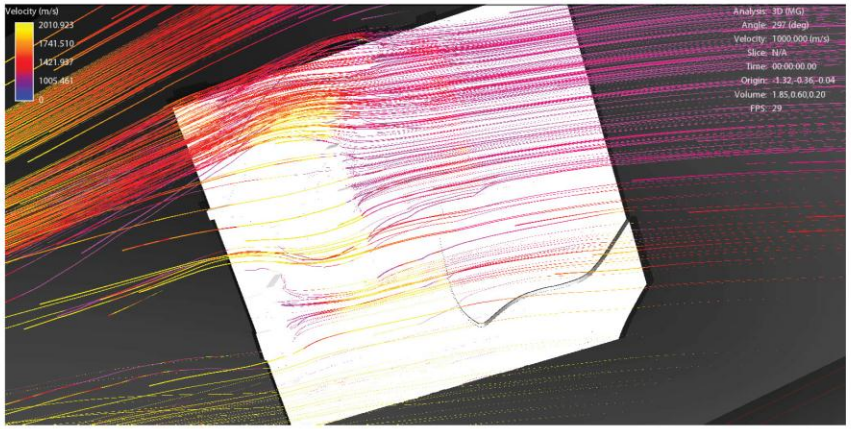


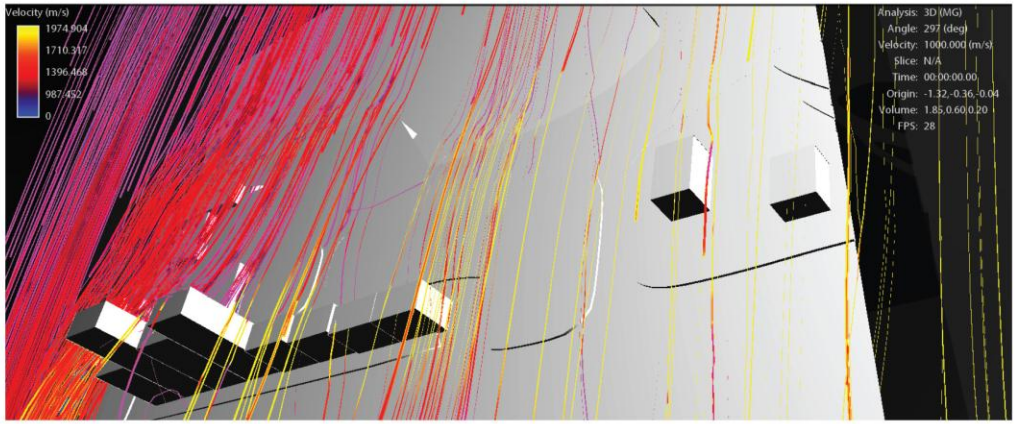
Performance design – Snow loads

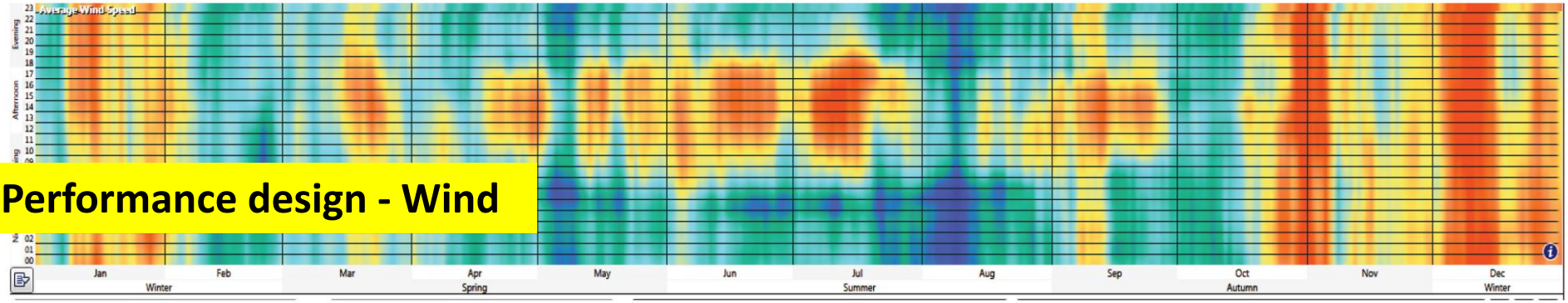






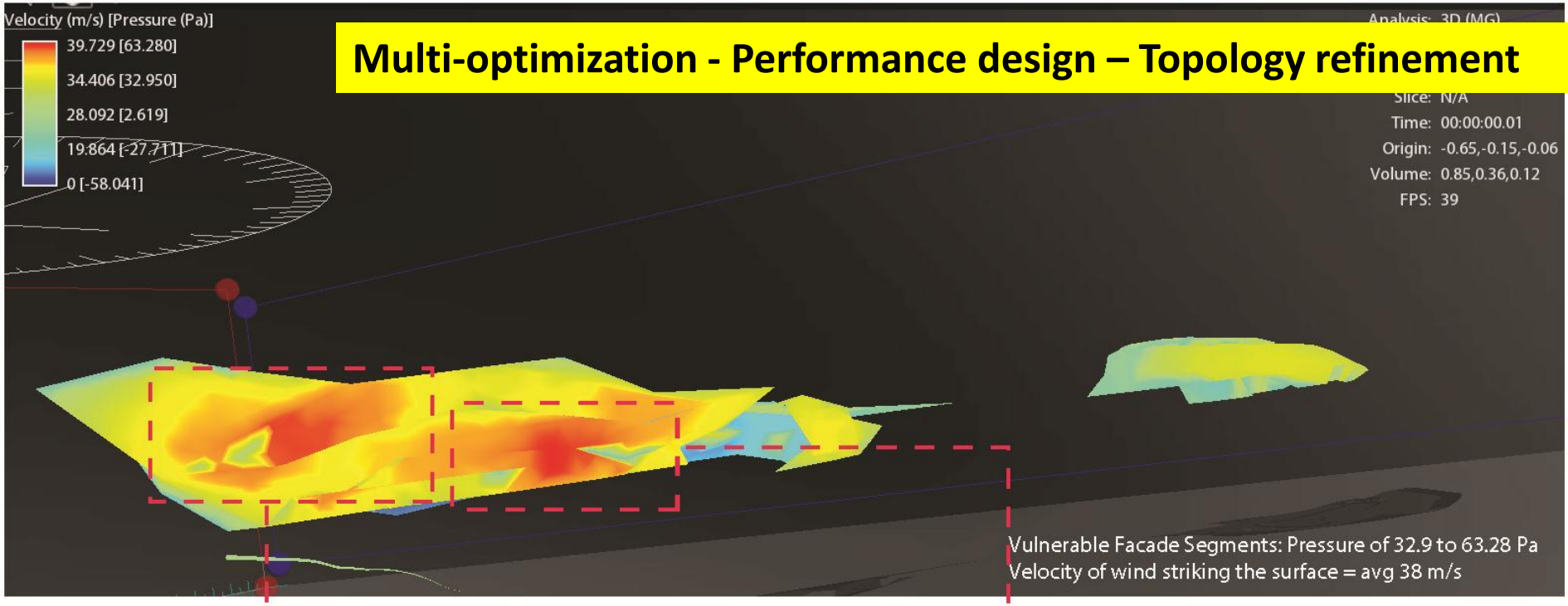


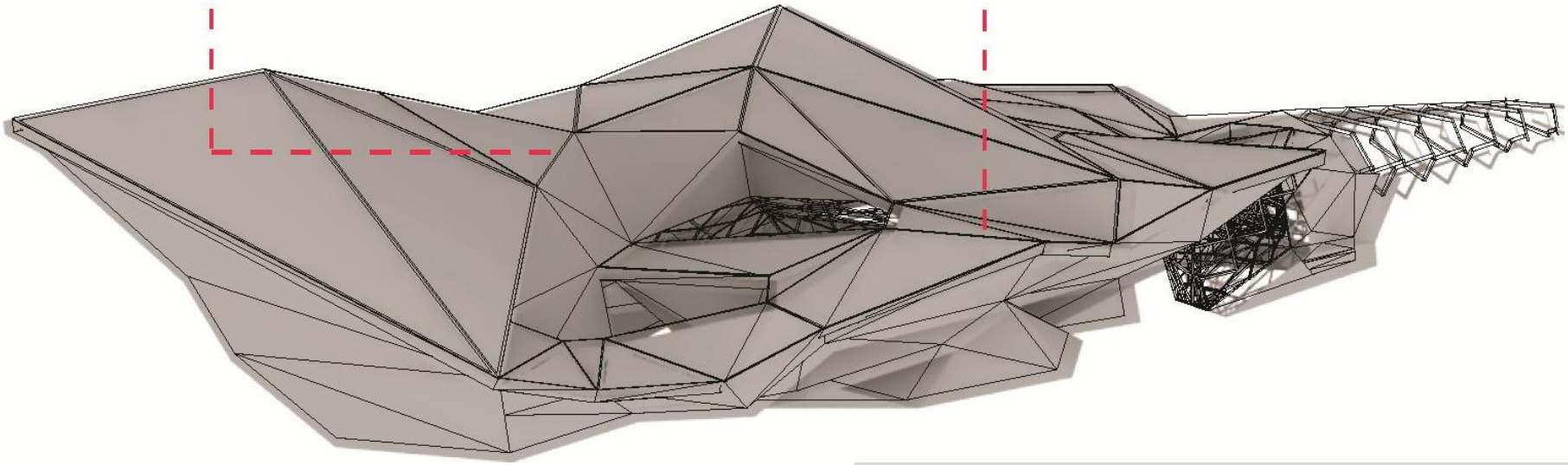




Performance design - Wind

Multi-optimization - Performance design – Topology refinement





Agriflux, Hyperbody Graduation project, Anurag Bhattacharya.
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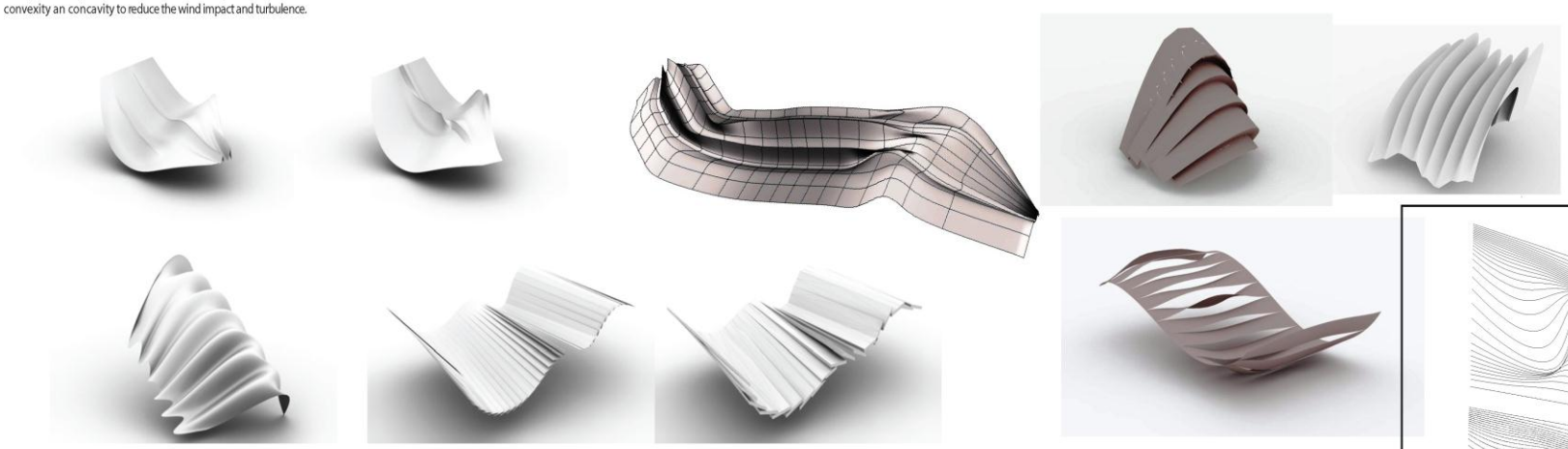
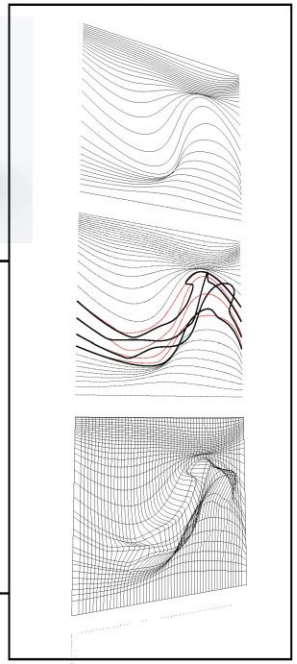
Surface pinching

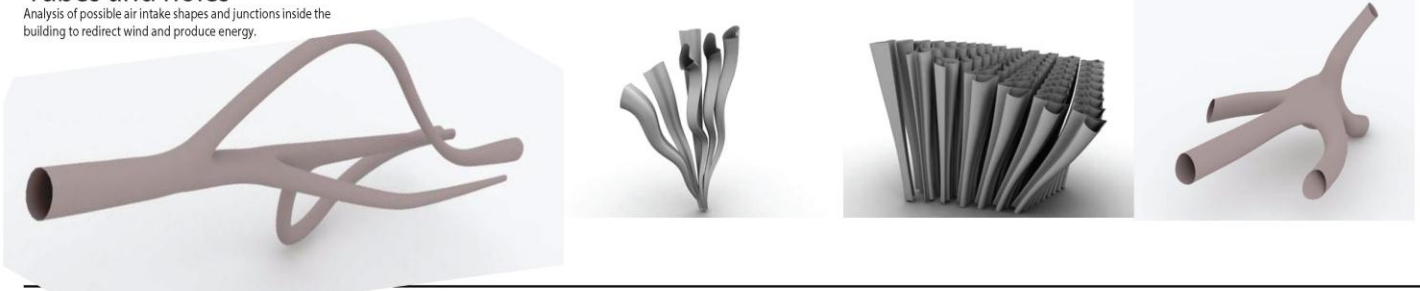
Study on aerodynamic surface creation from planar surfaces and on convexity an concavity to reduce the wind impact and turbulence.





Tubes and holes

Analysis of possible air intake shapes and junctions inside the building to redirect wind and produce energy.



Fillet shaped and symmetry

Shapes deriving from rounded form and study about symmetry and connections.

Wind Defelectors

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Multi-Performative Design Solutions

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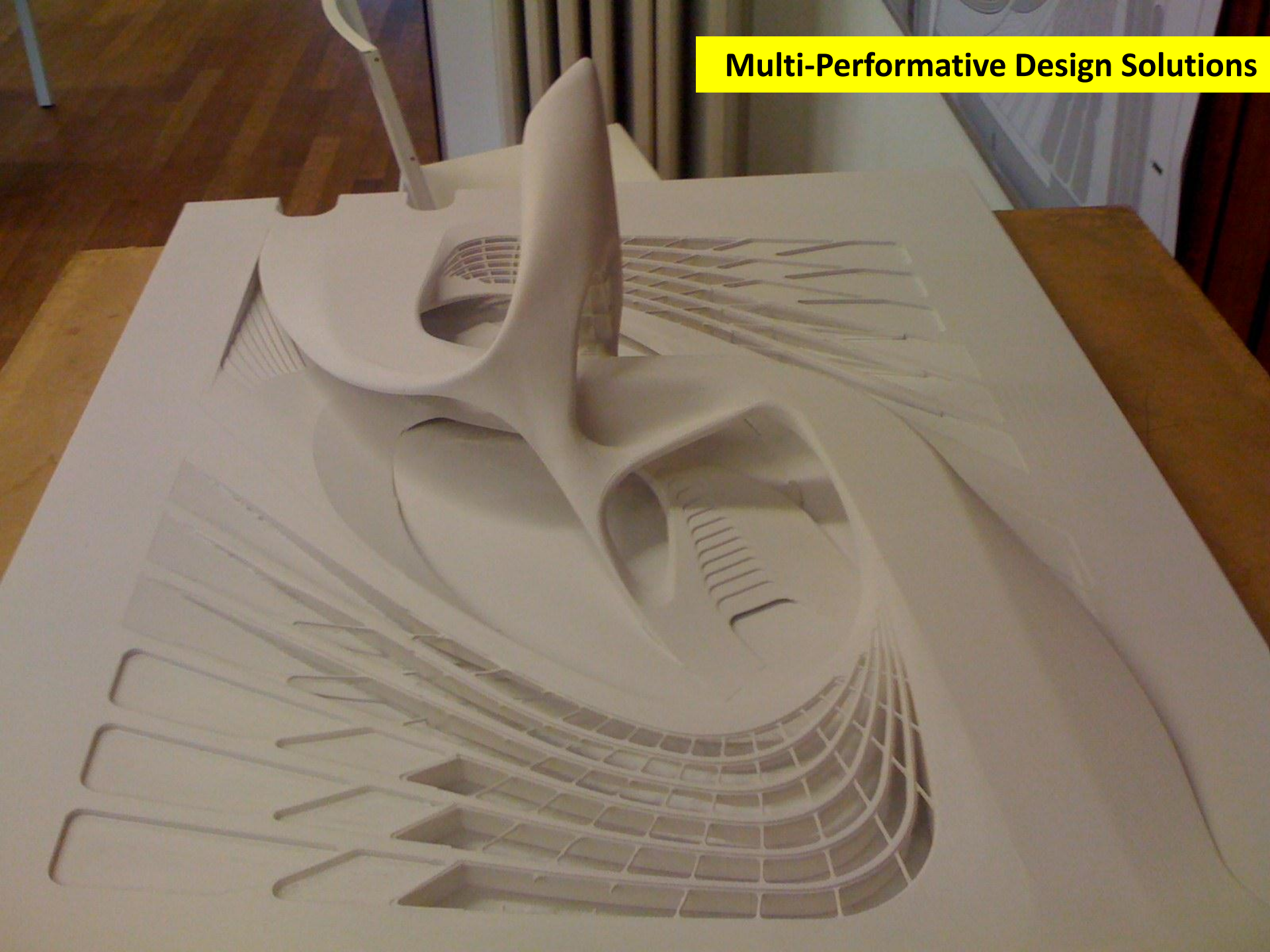
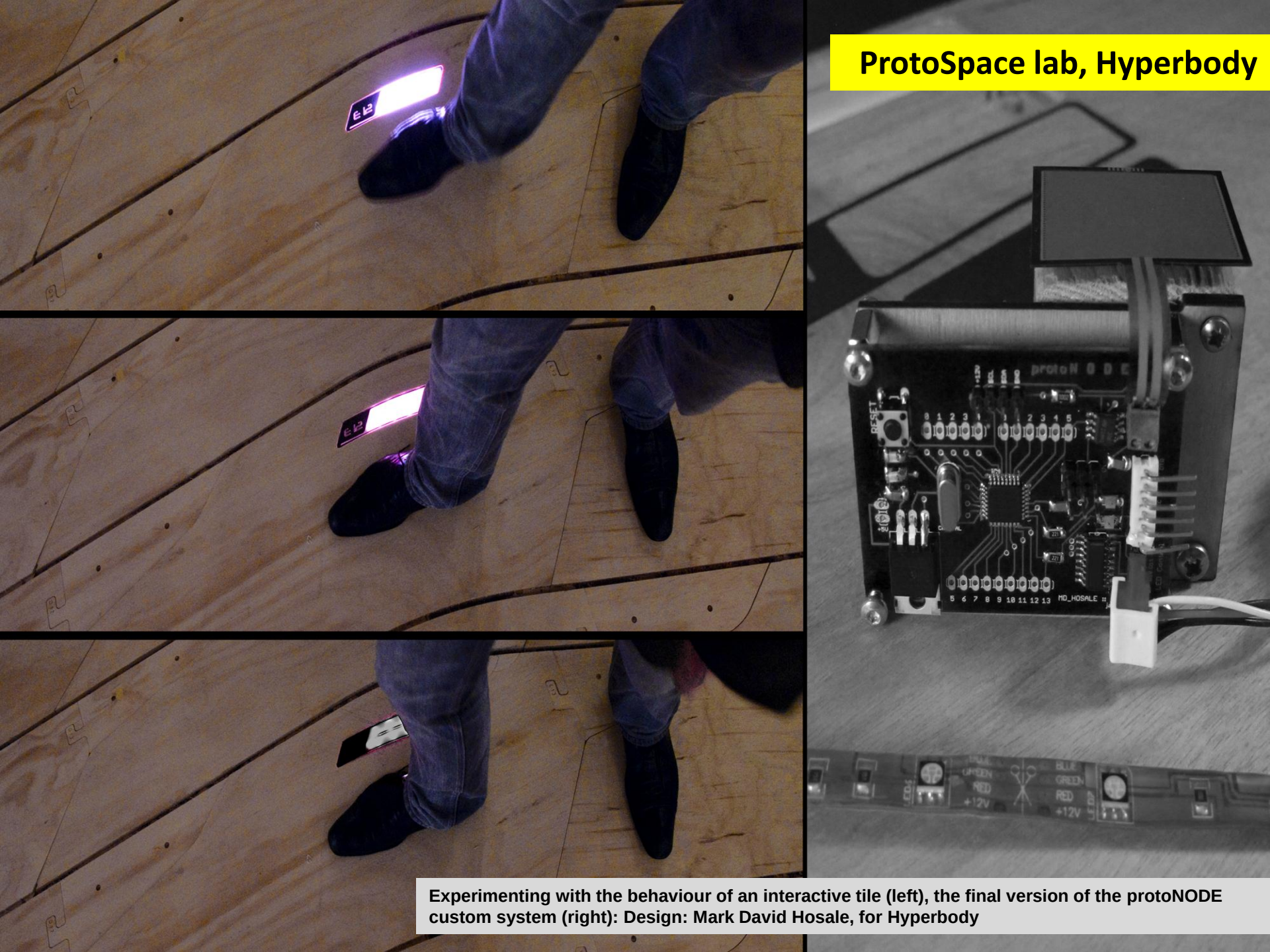
Multi-Performative Design Solutions



ProtoSpace lab, Hyperbody

protoDECK, a system of 361 one-off fully customizable wooden tiles. Parametric associative strategies for design and manufacturing are applied to the development of the system: Design: Marco Verde, for Hyperbody

ProtoSpace lab, Hyperbody



Experimenting with the behaviour of an interactive tile (left), the final version of the protoNODE custom system (right): Design: Mark David Hosale, for Hyperbody

THANK YOU FOR YOUR ATTENTION

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