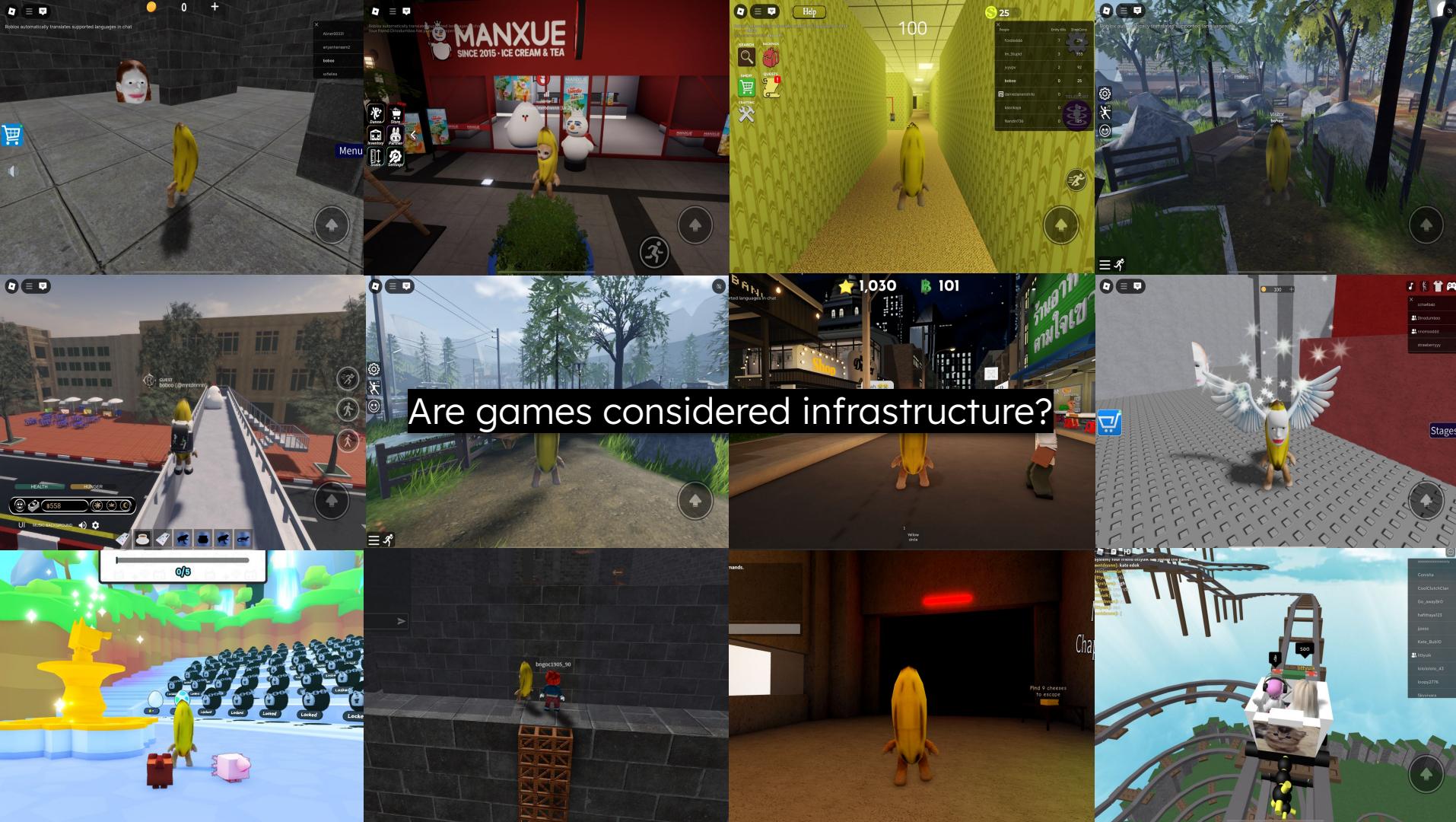


# Motion = Space

An experimental infrastructure for modeling architecture through data, behavior, and simulation



Are games considered infrastructure?

# Roblox & Server Service Global Infrastructure



CHEESE ESCAPE SERVER  
IP: 2606:4700:0000:0000:0000:6811:6fdf  
DATA CENTER: CALIFORNIA, USA

(51.0447, -114.0719)

(44.0, -119.0)

(20.5888, -100.3699)

(39.9612, 82.9988)

(45.5017, -73.5673)



THE BACKROOMS SERVER  
IP: 2607:f860:4002:c0c:5e  
DATA CENTER: ATLANTA, USA



IDENTITY FRAUD SERVER  
IP: 2606:4700:6813:d14f  
DATA CENTER: SAN FRANCISCO, USA



BANYAKARD SERVER  
IP: 2800:3f0:4001:8441:2003  
DATA CENTER: SAO PAULO, BRAZIL

(53.3498, -6.2603)

(61.1507, -0.1278)

(50.1109, 8.3821)

(48.8566, 2.3522)

(47.3769, 8.5417)

(45.4642, 9.1900)

(41.6916, -0.9057)

(26.2235, 50.5876)

(32.0853, 34.7818)

(24.7180, 46.6763)

(55.276987, 55.226249)

(29.0760, 72.8777)

(17.3880, 28.4867)

(13.6551, 100.5018)

(11.1396, 64.6865)

(-3.3524, 103.8193)

(-6.2088, 105.4158)

(-22.3193, 114.1694)

(-28.2229, -112.9387)

(-35.21, 103.8193)

(-37.8136, 144.9631)

(-33.8688, 151.2093)

(-36.8486, 174.7633)

ESCAPE THE HEAD SERVER  
IP: 2a00:1450:4026:802::2003  
DATA CENTER: DUBLIN, IRELAND

(59.3293, 18.0686)

(50.1109, 8.3821)

(48.8566, 2.3522)

(47.3769, 8.5417)

(45.4642, 9.1900)

(41.6916, -0.9057)

(26.2235, 50.5876)

(32.0853, 34.7818)

(24.7180, 46.6763)

(55.276987, 55.226249)

(29.0760, 72.8777)

(17.3880, 28.4867)

(13.6551, 100.5018)

(11.1396, 64.6865)

(-3.3524, 103.8193)

(-6.2088, 105.4158)

(-22.3193, 114.1694)

(-28.2229, -112.9387)

(-35.21, 103.8193)

(-37.8136, 144.9631)

(-33.8688, 151.2093)

(-36.8486, 174.7633)



DOLLHOUSE SERVER  
IP: 2001:fb0:1061:d2::cb90:9172  
DATA CENTER: DIN DAENG, THAILAND

(39.9042, 116.4074)  
(37.5665, 126.9780)  
(35.682839, 139.759455)

(34.6937, 135.5023)

(28.2229, -112.9387)

(-22.3193, 114.1694)

(-28.2229, -112.9387)

(-35.21, 103.8193)

(-37.8136, 144.9631)

(-33.8688, 151.2093)

(-36.8486, 174.7633)



DEADLY CONTENT SERVER  
IP: 2404:6800:4001:810::200e  
DATA CENTER: SYDNEY, AUSTRALIA



BANGKOK DINNER SERVER  
IP: 2404:6800:4003:cfc:15e  
DATA CENTER: SINGAPORE, SINGAPORE



# GAME SERVER

GAME SERVERS

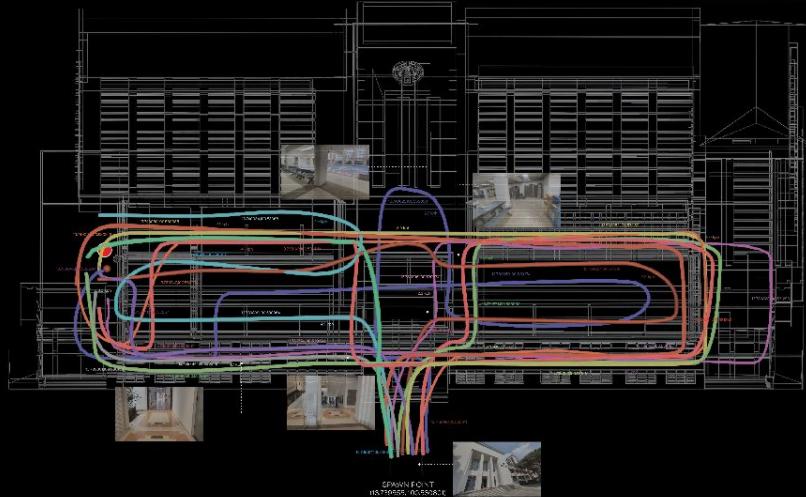
- MOVEMENT COORDINATE (X,Y,Z)  
- SPEED (0-10 IN PODEX SCALE) -> CURVE THICKNESS (0-1)



# REAL WORLD

**REAL WORLD**

- WALKING SPEED (KPH BY IPHONE) -> CURVE THICKNESS (0-5)



How can movement modify space?



# MOTIONMAP

an adaptive playground game where movement shape spaces

# ASSETS

## PLAYGROUND OBJECTS



1 STEPPING STONES



2 JUMPING GAP



3 FOG ZONE



4 SPINNING DOOR



5 TRAMPOLINE JUMP



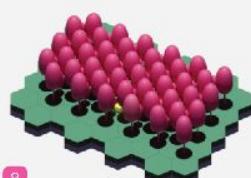
6 MAZE



7 RAMP WALK



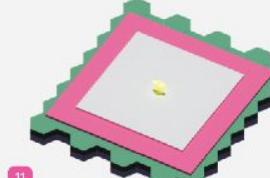
8 TRANSPARENT BRIDGE



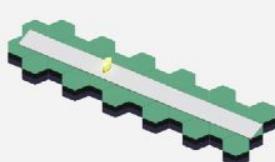
9 FOREST



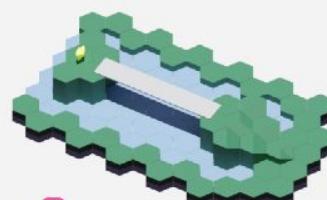
10 ZIGZAG



11 WALKING ON ICE



12 CONVEYOR BELT



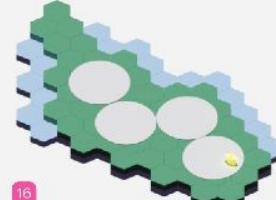
13 TREADMILL



14 MOVING PLATFORM



15 SQUID GAME GLASS BRIDGE



16 SPINNING PLATFORM



17 MIRRORS



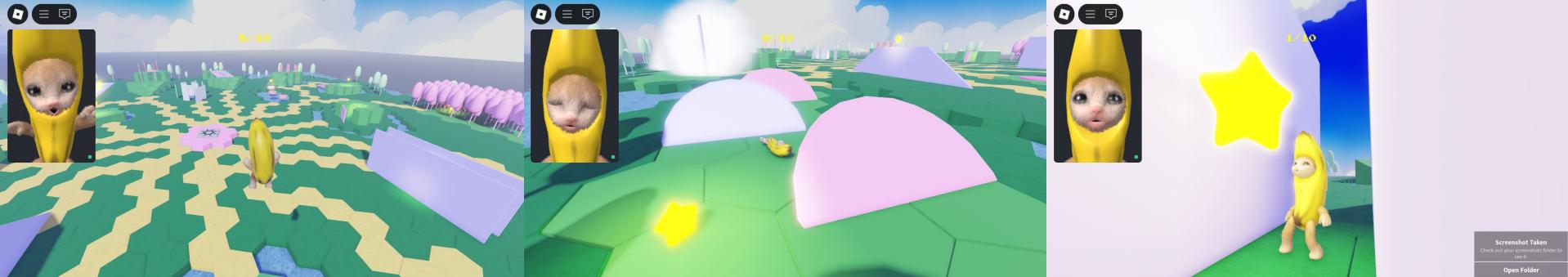
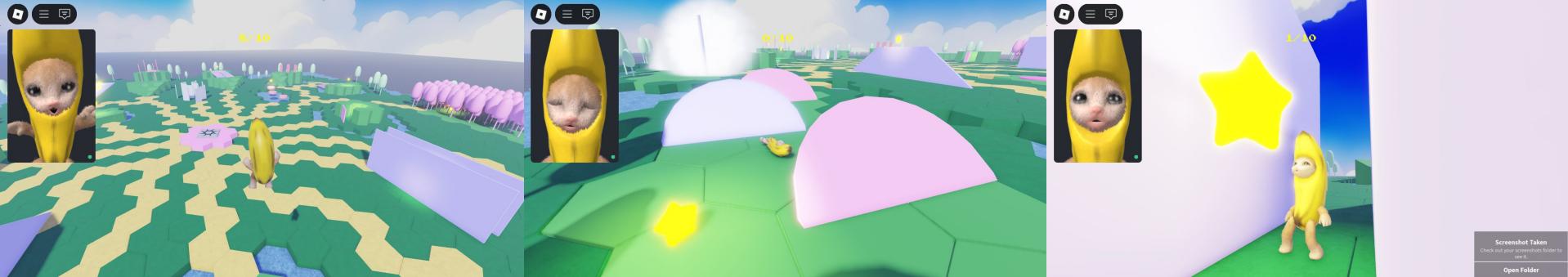
18 CLICK TO OPEN



19 NARROW PASSAGE



20 RUNWAY



Screenshot Taken  
Check out your screenshots folder to see it.

Open Folder



POSSIBLE  
OUTCOME:

GAME  
VER.

#2

RULES/SYSTEMS:

if most interacted => increase difficulty

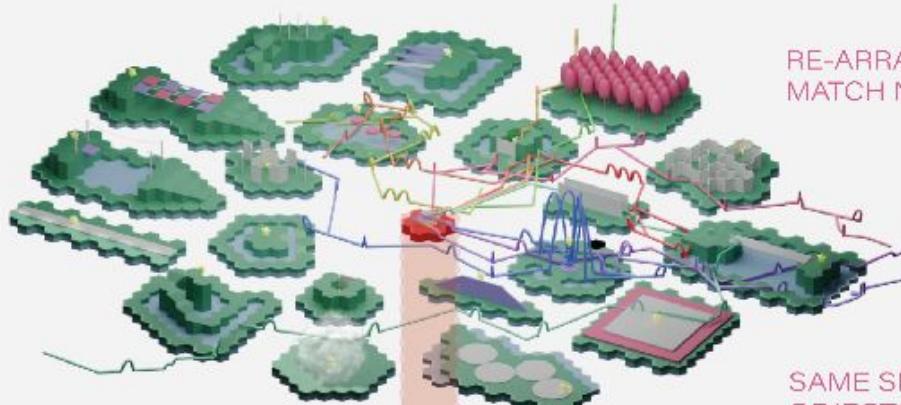
if least interacted => delete

if path most walked on => expand corridor

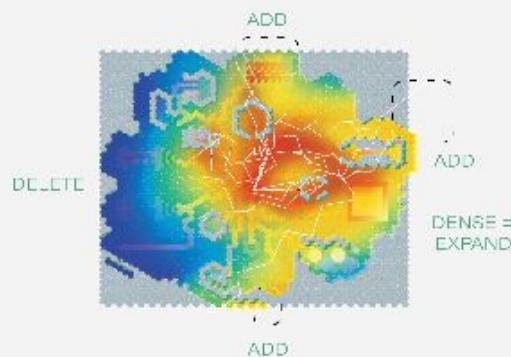
if path least walked on => delete space

ANALYSIS  
FROM 10  
PATHS

- CROWD  
SPOTS
- SPACES  
NEVER  
REACHED

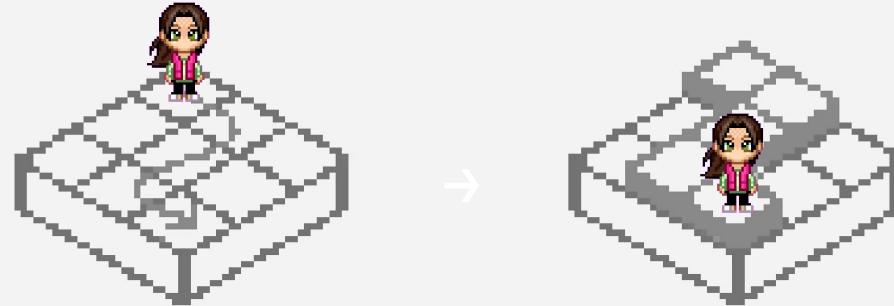


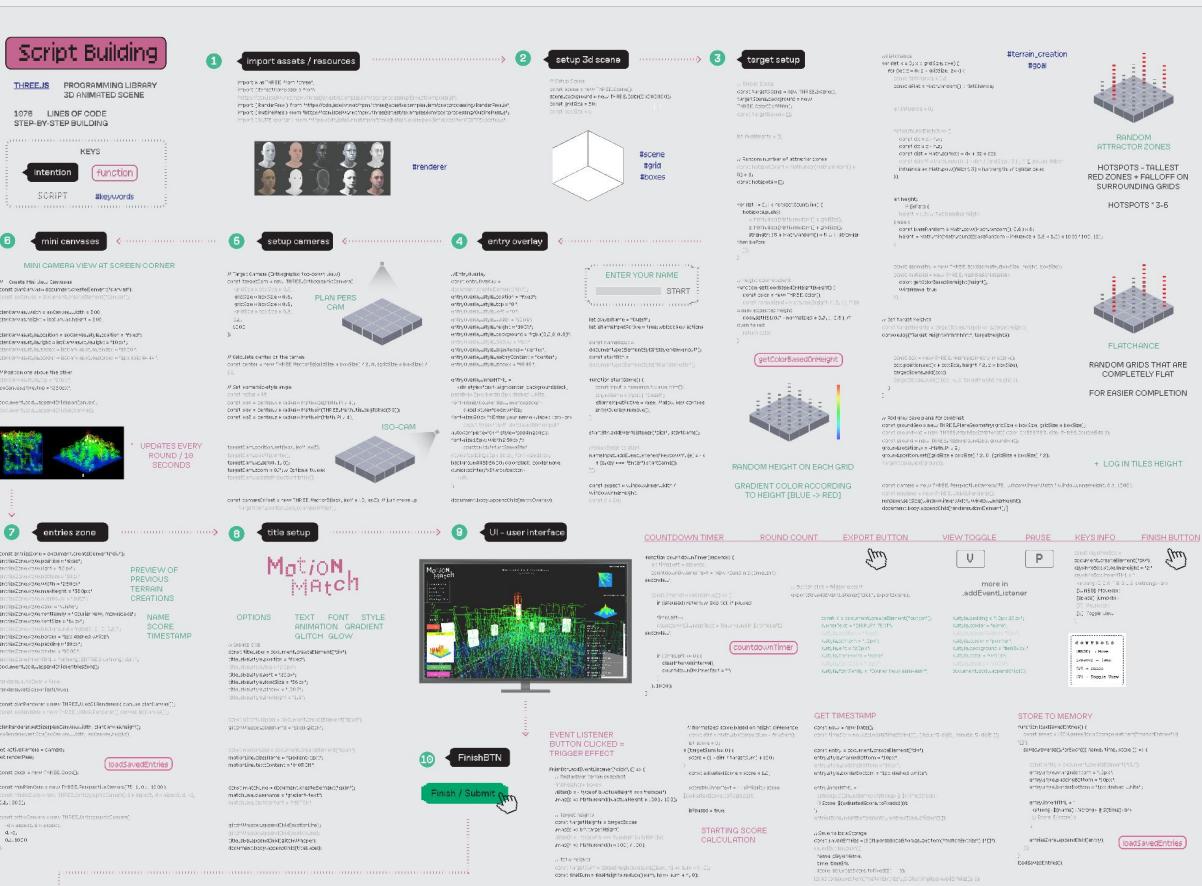
RE-ARRANGE ASSETS TO  
MATCH NEW SPACES

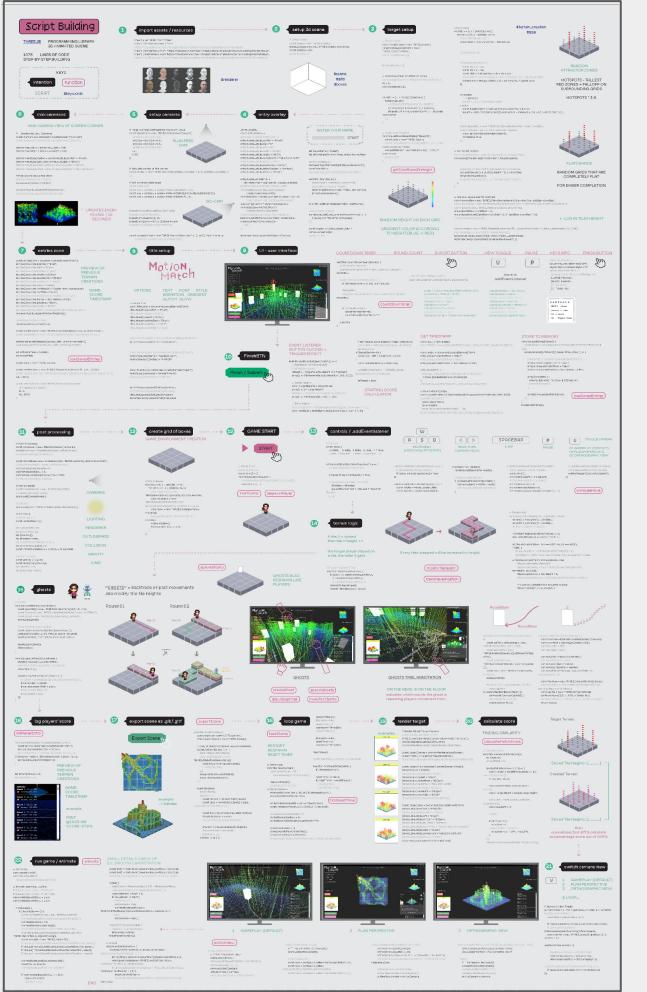


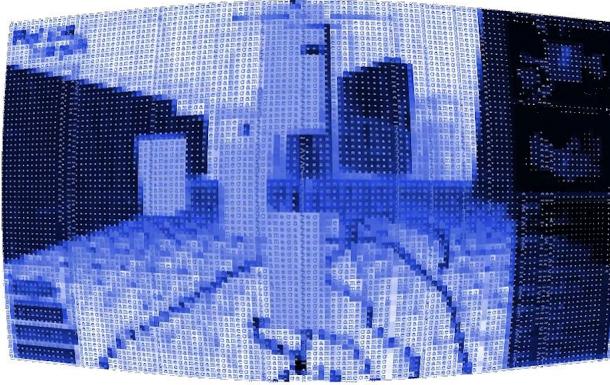
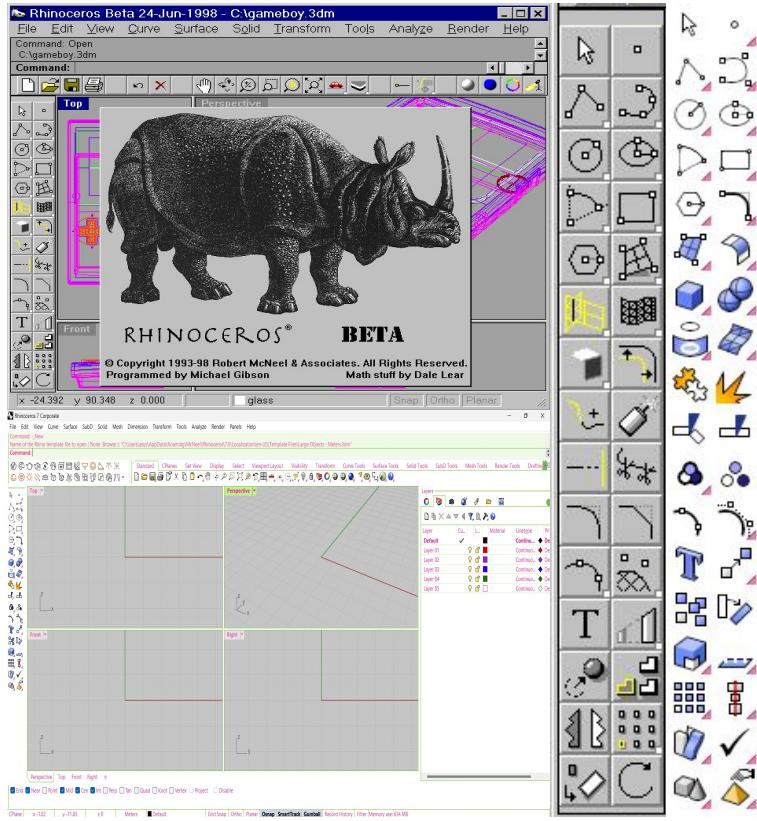
SAME SPAWN POINT, MOVE  
OBJECTS. EXPAND OLD ONES

How can movement modify space in real time?









→

Data  
Movement  
Behavior  
Game  
Simulation

## What I'm against

[ enemy ]

The dominance of conventional modeling tools and workflows in architecture

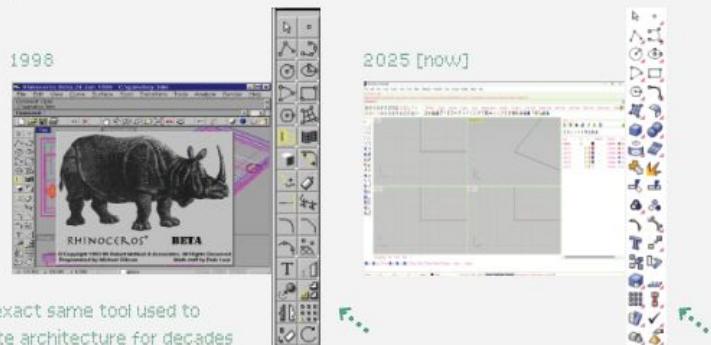
That includes ...

traditional toolset

static authorship

fixed environment that could limit experimentation

For example



the exact same tool used to create architecture for decades

## What I'm for

[ argument ]

Dynamic, Responsive, Participatory design process and result

That includes ...

traditional toolset

static authorship

fixed environment that could limit experimentation

Behavior  
[ movement & interaction in space ]

Participatory  
/collaborative  
agent-based system

Live simulation of spatial usage and evolution

## What I created

[ this project ]



New experimental infrastructure / workflow for modeling architecture through data, behavior, and simulation

# Workflow Process

START



DESIGN A  
HOUSE/CREF/MALL...  
FOR ME AT THIS SITE  
[LOCATION...]



OK! BUT THIS TIME I WILL  
DESIGN FROM MOVEMENT  
& BEHAVIOR DATA USING  
GAME & SIMULATION

PREPARE STARTING RESOURCES



#1  
GAME

MOTIONMATCH

1.1 PLUG IN  
• UTM83, LONITUDE,  
CITY DESIGN FILE

THIS IS IMPORTED FROM MOTION MATCH.  
BY IMPORTING, AND EXPORT PLACES  
DATA HERE, AND THERE IS A SITE.

THIS IS IMPORT...



1.2 PLAY THE  
SITE AS A GAME!



CONTROLS: SWIMMING  
MOVEMENT, WALKING,  
ROTATION, JUMPING,  
GRAB, JUMP, SPRINT,  
SITE HOR. SPHERE VIEW

1.3 OUTPUT

TERMINATE RECORD  
OF POSITION



LOGFILE  
• OFFICE HGT 6.00  
• OFFICE HGT 6.00  
• OFFICE HGT 6.00  
• OFFICE HGT 6.00  
• OFFICE HGT 6.00

SOURCE: DRAFT

REPORT

#2  
SIMULATION

CELLULAR AUTOMATA

9.0 PERCENT FULL SETS (CELLULAR AUTOMATA)

CORPORATION | CRYSTAL | CORAL | VIRUS | FOREST  
CLUE | FIRE | CRIME | EXPLOSION

THIS IS FULL HP 25%...



PHOTO PROCESS STRUCTURE TO  
NAME SIMULATION SETS (Landscape, Roads, Utilities, ...)

2.3 OUTPUT

EXPORT SIMULATION TIMELINE

SIMULATED RESULT  
MESH MODEL



Cellular Automata  
with starting model  
according to  
any simulation

#3  
POST-PROCESS

AUTO-PROCESSING SCRIPT

3.1 SET RULES / PARAMETERS

- SITE\_HEIGHT\_NATURAL=0.8
- SITE\_HEIGHT\_BUILT=1.0
- COLUMN\_H=1.575, THRESHOLD=1
- COLUMN\_H=1.075, THRESHOLD=1
- FLOOR\_ZEROFLOOR=1.075, THRESHOLD=1

RESULTS

• MESHES is selected, similar in each horizontally  
row, move to another  
• OR (Bad) bounding box, result, and replace

3.2 RUN TO AUTO-PROCESS



button click on result imported  
mesh based on seed and site

3.3 MANUAL ADJUSTMENTS  
TO FINAL OUTPUT

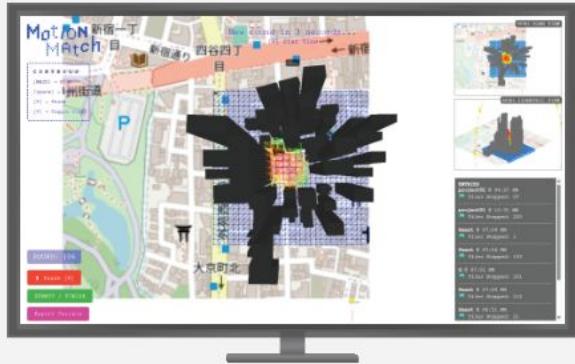


END

# #1

## GAME

MOTIONMATCH



# #2

## SIMULATION

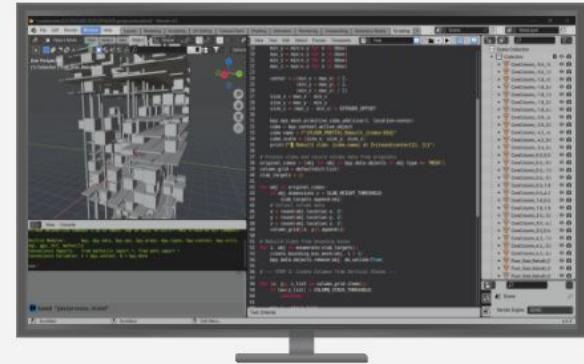
CELLULAR AUTOMATA



# #3

## POST-PROCESS

AUTO-PROCESSING SCRIPT



# #1

## GAME

### MOTIONMATCH

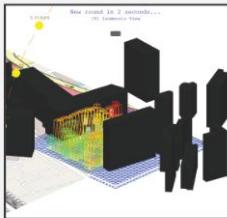
#### 1.1 PLUG IN

- LATITUDE , LONGITUDE
- CITY .GEOJSON FILE

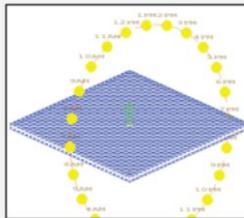
THIS WILL IMPORT ...



Map texture



buildings



sunpath

from OpenStreetMap (OSM) & SunCalc

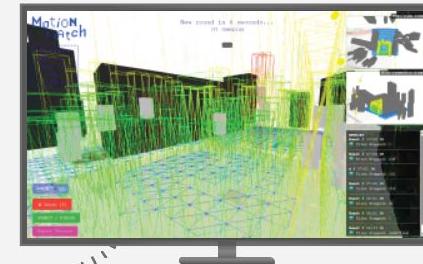
drawsunpath from SunCalc  
sun movement and sunlight phases  
every hour = add sphere & label

#### 1.2 PLAY THE SITE AS A GAME!

CONSIDER SPATIAL INTUITION

How would you move throughout the site?

Relationship with surrounding buildings



# #1

## GAME

MOTIONMATCH

### 1.3 OUTPUT

TERRAIN AS A RECORD  
OF MOVEMENT



#### SCRIPT

- delete flat slab
- select random blocks
- add point at the tip
- format those as json

BLOCK DATA in json

```
{
  "blockID": 1,           name
  "blockColor": "red",   color
  "blockHeight": 4,      tip
  "position": {
    "x": 17,
    "y": -17,
    "z": 4
  }, ...               coordinates
} } , ...             repeat
```

# #2

## SIMULATION

### CELLULAR AUTOMATA

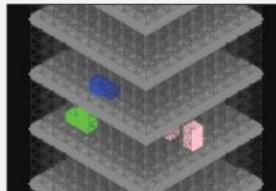
#### 2.1 PLUG IN

- LATITUDE , LONGITUDE
- CITY .GEOJSON FILE
- BLOCK DATA in json

THIS WILL IMPORT ...



HDRI skybox in background



Cellular Automata  
origin starting blocks

#### 2.2 EXPLORE SIMULATION

9 DIFFERENT RULESETS [CELLULAR AUTOMATA]

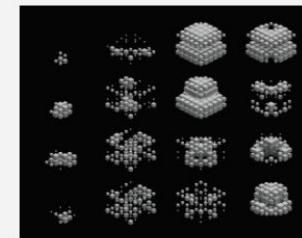
CONWAY   CRYSTAL   CORAL   VIRUS   FOREST  
CLOUD   MAZE   CAVES   EXPLOSION



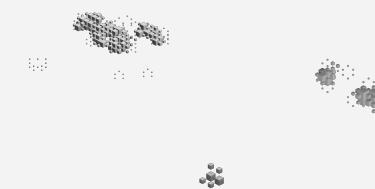
PRESS 'PROCESS STRUCTURE' TO  
auto-process blocks as tag [columns, floors, windows, ... ]

#### 2.3 OUTPUT

EXPORT SIMULATION TIMELINE



SIMULATION RESULT  
MASS MODEL



# #3

## POST-PROCESS

### AUTO-PROCESSING SCRIPT

#### 3.1 SET RULES / PARAMETERS

- SLAB\_HEIGHT\_THRESHOLD = 0.3
- EXTRUDE\_OFFSET = 0.0
- COLUMN\_STACK\_THRESHOLD = 1
- COLUMN\_WIDTH = 1
- FLOOR\_PREFIX = "Floor\_Slab"

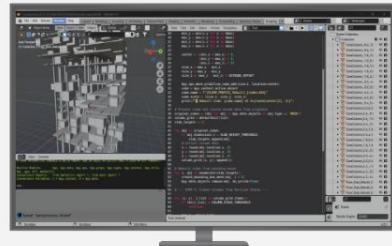
if [block] is adjacent, similar in size horizontally  
then merge & flatten  
/ or read bounding box, rebuilt, and replace



if [block] is stacked up vertically for more  
than X steps  
then connect through columns  
/ by creating cube mesh



#### 3.2 RUN TO AUTO-PROCESS



python script that modify imported  
models based on said rules



#### 3.3 MANUAL ADJUSTMENTS TO FINAL OUTPUT





# Project Examples

*outcome of the workflow*



**PROJECT 01**

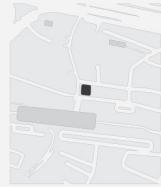
Wooden Cafe, Bangkok



## Site



LAT : 13.735595  
LON : 100.445930  
SITE WIDTH : 30 m  
SITE LENGTH : 30 m  
MAX HEIGHT : 10 m  
bangkok.jedeon



## Game



## Simulation



## Post-Process

**PROJECT 02**

Community Mall, Bangkok



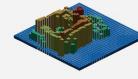
## Site



LAT : 13.735979  
LON : 100.445735  
SITE WIDTH : 150 m  
SITE LENGTH : 140 m  
MAX HEIGHT : 20 m  
bangkok.jedeon



## Game



## Simulation



## Post-Process

**PROJECT 03**

Condominium, Bangkok



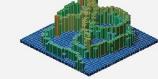
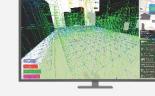
## Site



LAT : 13.735345  
LON : 100.446193  
SITE WIDTH : 50 m  
SITE LENGTH : 48 m  
MAX HEIGHT : 70 m  
bangkok.jedeon



## Game



## Simulation



## Post-Process



## PROJECT 04 Residential Building, Tokyo

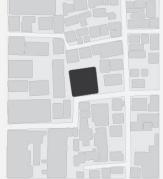


### Site

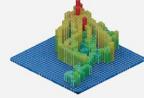


Daibō Park, Shinjuku, Tokyo

LAT : 35.654749  
LON : 139.715742  
SITE WIDTH : 15 m  
SITE LENGTH : 28 m  
MAX HEIGHT : 40 m  
takayoshiokita



### Game



### Simulation



### Post-Process



## PROJECT 05 Student Pavilion, Amsterdam



### Site

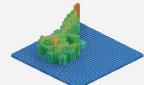


Pontaanstraat 21, Amsterdam

LAT : 52.355473  
LON : 4.029402  
SITE WIDTH : 9 m  
SITE LENGTH : 9 m  
MAX HEIGHT : 5 m  
amsterdam-pavillon



### Game



### Simulation



### Post-Process



## PROJECT 06 Tower, New York



### Site

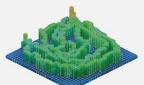
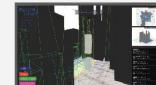


Light St, New York

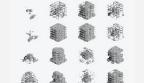
LAT : 40.751218  
LON : -74.007451  
SITE WIDTH : 50 m  
SITE LENGTH : 50 m  
MAX HEIGHT : 50 m  
newyork-tower



### Game



### Simulation



### Post-Process





