

Keeping up with the Code: Tracing Decision Making History in Architectural Scripts

A research project by:

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Hamilton**

In partnership with...





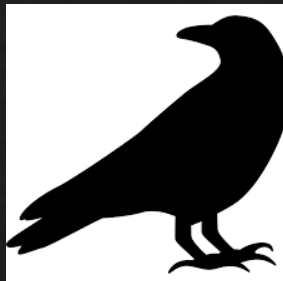
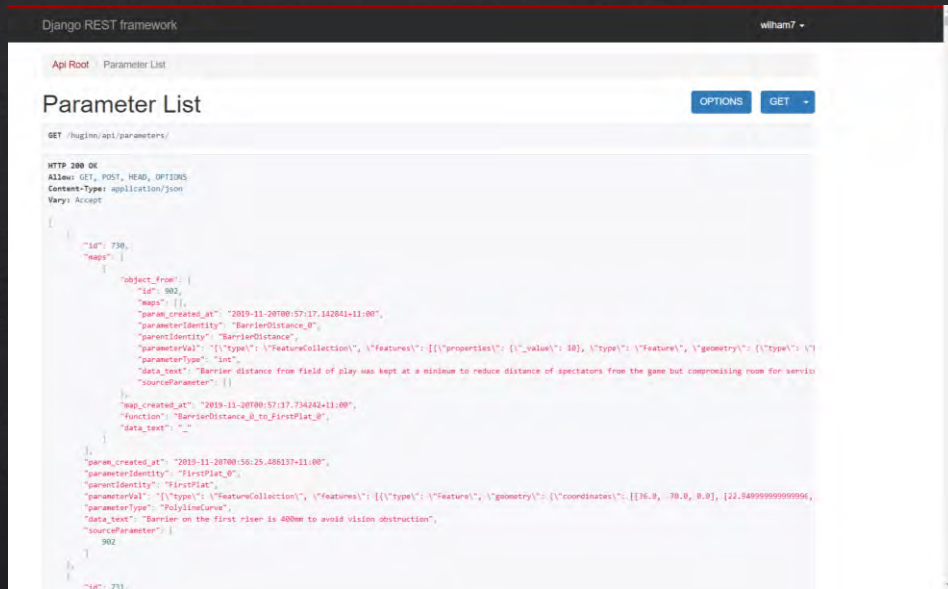
What are the issues to address?

Collecting data is important

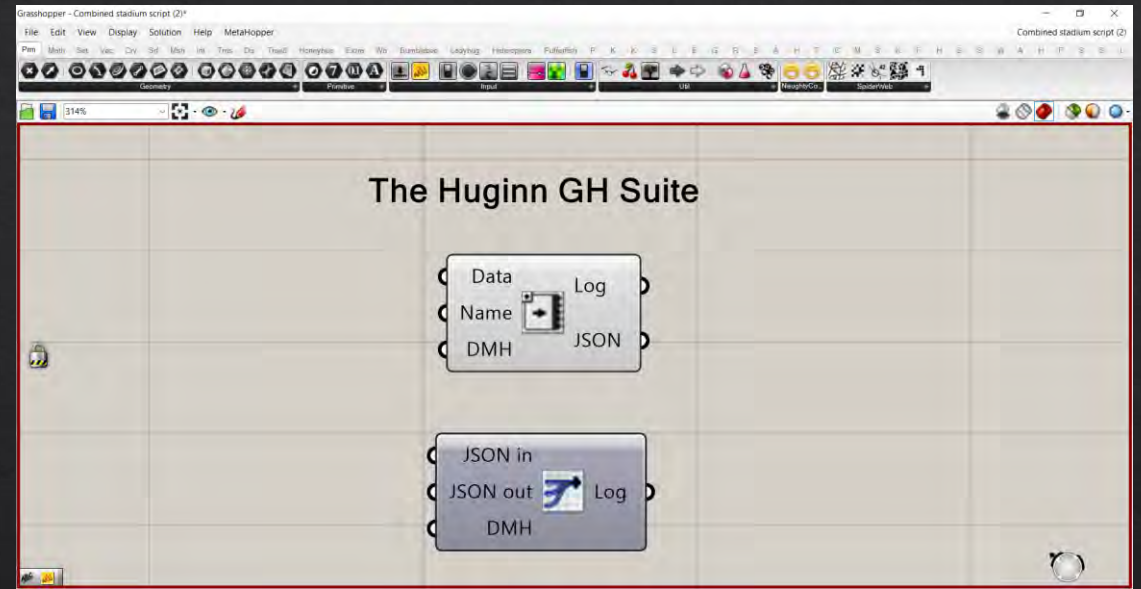
**Decisions are fundamental
to architecture**

Coding is confusing

What was created



Huginn web application



Grasshopper workflow

The Process

◆ What is an architectural script?



Grasshopper

Or



Dynamo

Or



Python

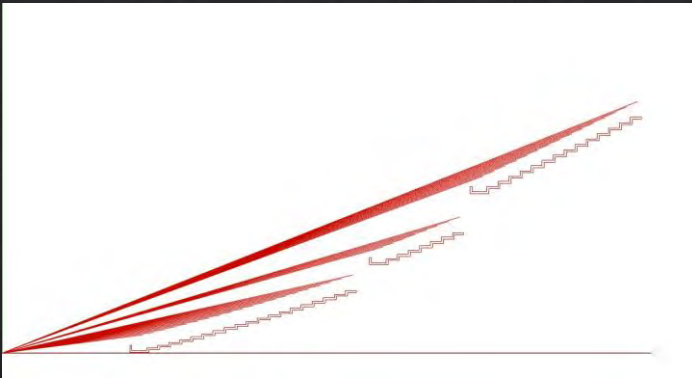
Or



Many more...

The Process

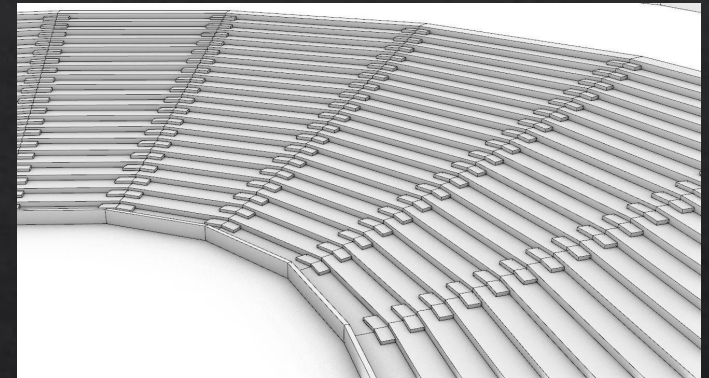
◆ The case study: A stadium bowl script



Sightlines



Field and risers

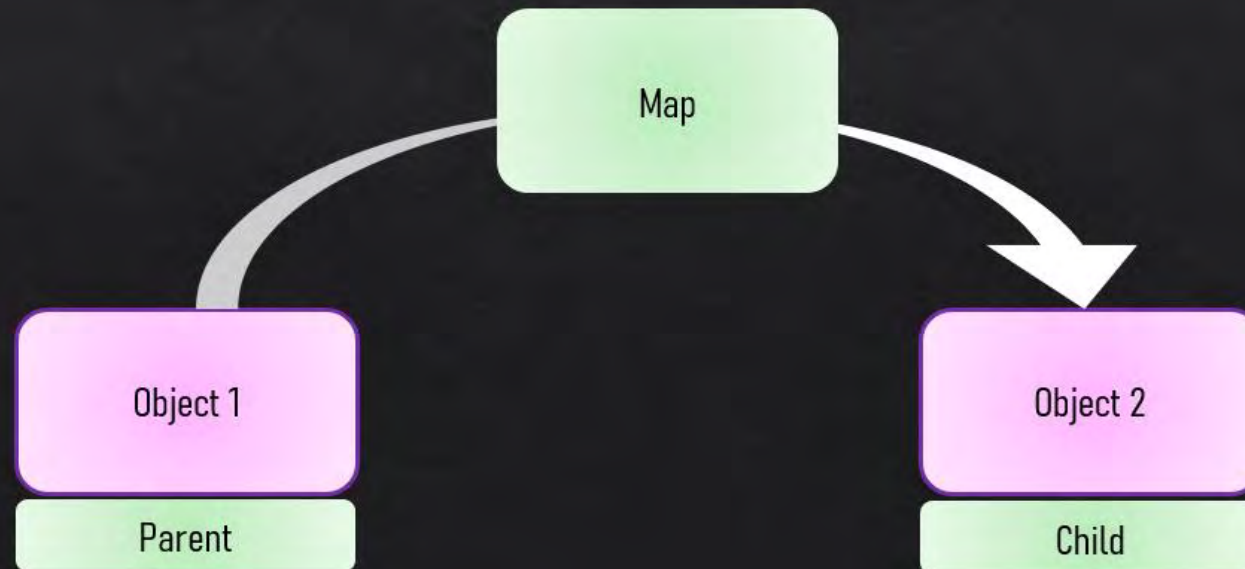


Egress and seating

The Process

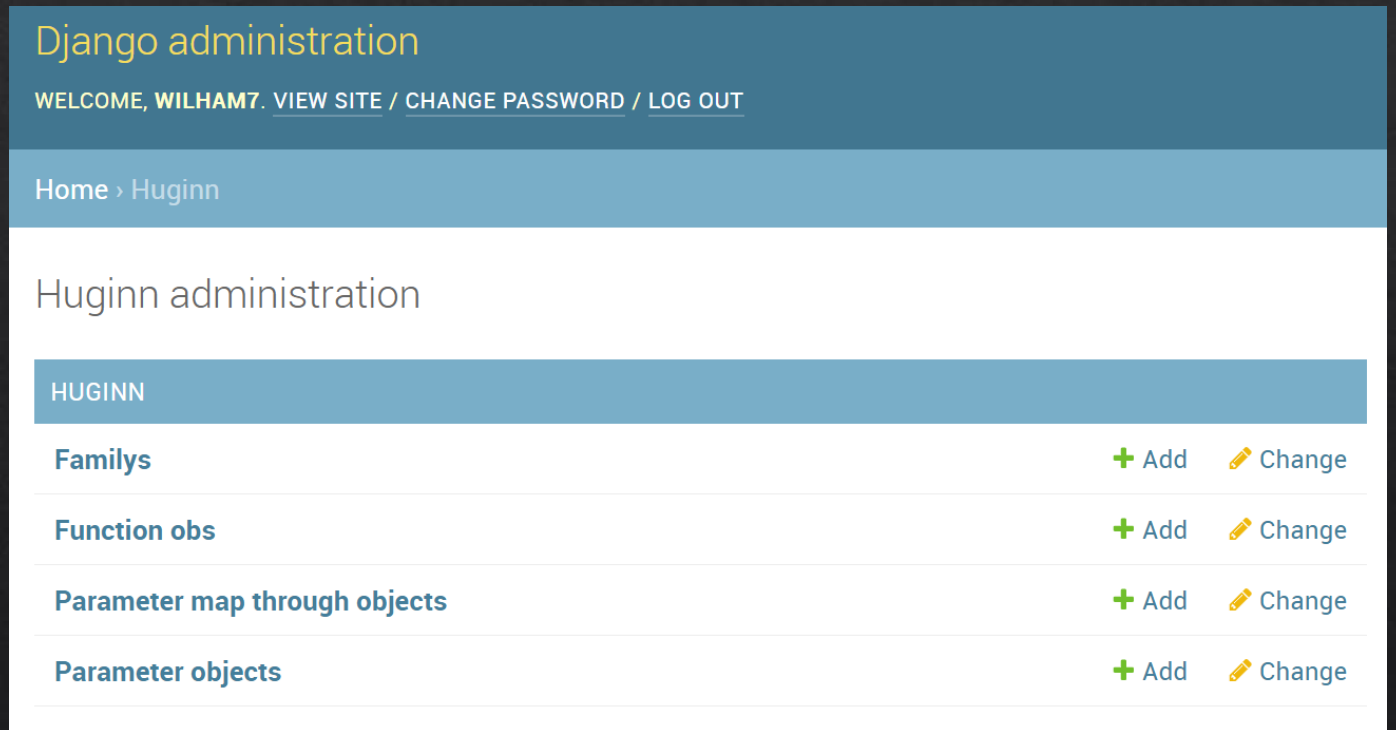
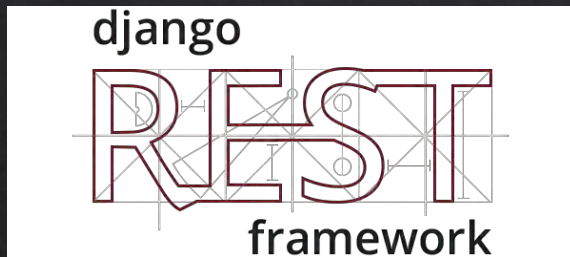
◆ Relational databases: Python classes

```
class parameterMapThroughObject(models.Model):  
    map_created_at = models.DateTimeField(auto_now=True)  
    object_from = models.ForeignKey('parameterObject', on_delete=models.CASCADE, related_name='through_from')  
    object_to = models.ForeignKey('parameterObject', on_delete=models.CASCADE, related_name='through_to')
```



The Process

◆ Making the database accessible



The Process

◆ Storing data on Huginn

```
[
  {
    "id": 730,
    "maps": [
      {
        "object_from": {
          "id": 902,
          "maps": [],
          "param_created_at": "2019-11-20T00:57:17.142841+11:00",
          "parameterIdentity": "BarrierDistance_0",
          "parentIdentity": "BarrierDistance",
          "parameterVal": "{\type\: \"FeatureCollection\", \"features\": [{\properties",
          "parameterType": "int",
          "data_text": "Barrier distance from field of play was kept at a minimum to redu",
          "sourceParameter": []
        },
        "map_created_at": "2019-11-20T00:57:17.734242+11:00",
        "function": "BarrierDistance_0_to_FirstPlat_0",
        "data_text": "_"
      }
    ]
  }
]
```

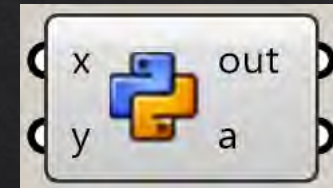
Required Inputs	What it is?
ID	Internal unique Huginn number
Parameter created at	What time was the object made
Parameter ID	Assigned name for the object
Parent ID	Assigned name for a group of similar objects
Parameter value	The archiJSON that describes the geometry in text format
Parameter type	What type of text or geometry is the object?
Data text	Notes and Decision Rationale documentation

The Process

◆ Sending sample data from Grasshopper

```
Sample text
{
  "parameterIdentity":
    "myobject5",
  "parameterType": "Int",
  "parameterVal": 20,
  "parentIdentity": "parent3",
  "data_text": "New Text"
}

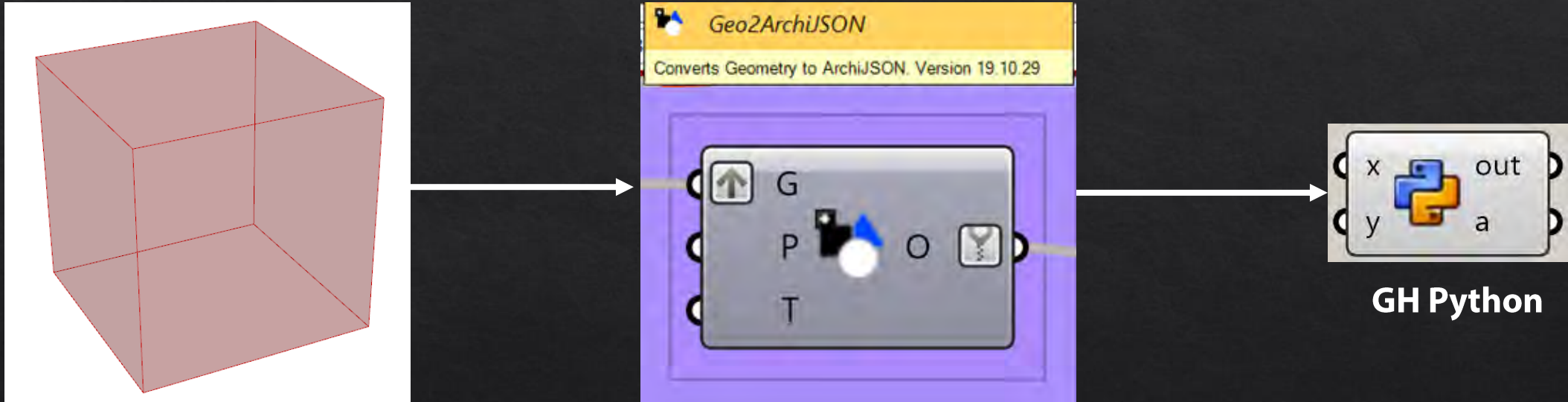
{
  "object_from": "myobject1",
  "object_to": "myobject2",
  "function": "efg_function2",
  "data_text": "Test text"
}
```



GH Python

The Process

◆ Sending geometry from Grasshopper



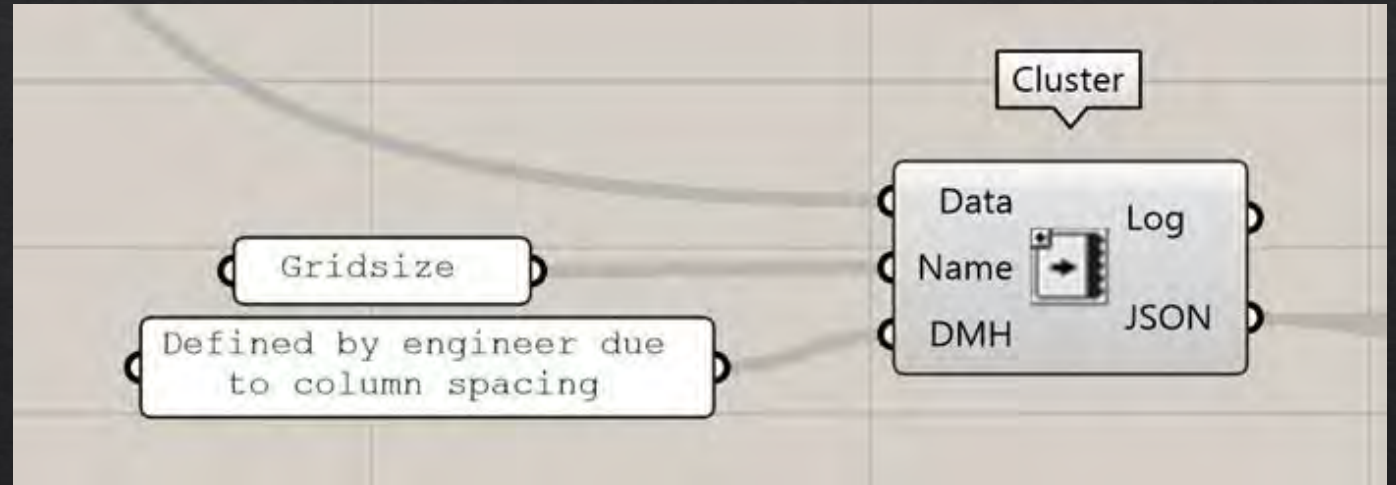
Simplification of the Workflow

All Huginn inputs

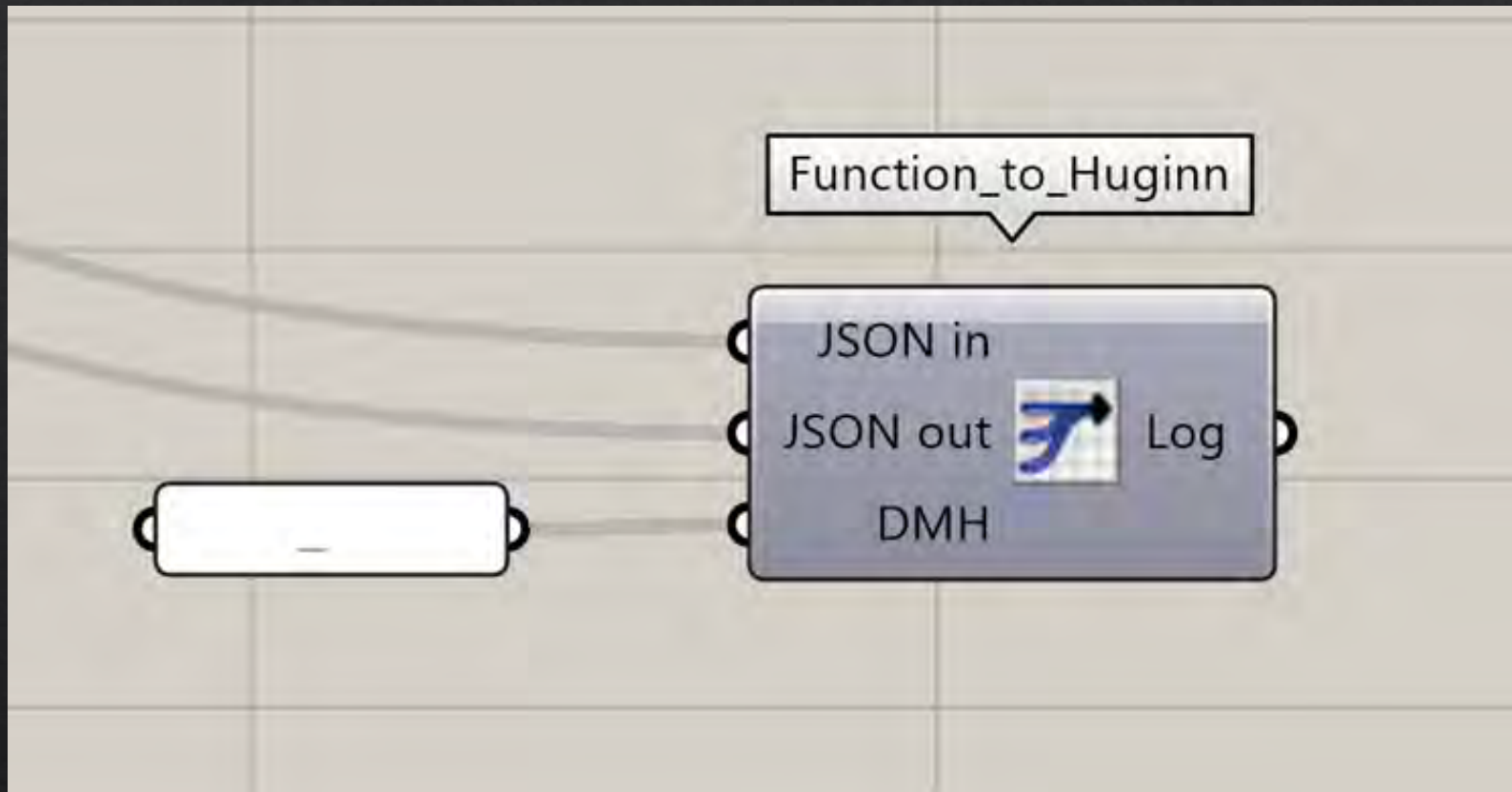
Required Inputs	What it is?
ID	Internal unique Huginn number
Parameter created at	What time was the object made
Parameter ID	Assigned name for the object
Parent ID	Assigned name for a group of similar objects
Parameter value	The geoJSON that describes the geometry in text format
Parameter type	What type of text or geometry is the object?
Data text	Notes and Decision Making History documentation



Inputs in Grasshopper

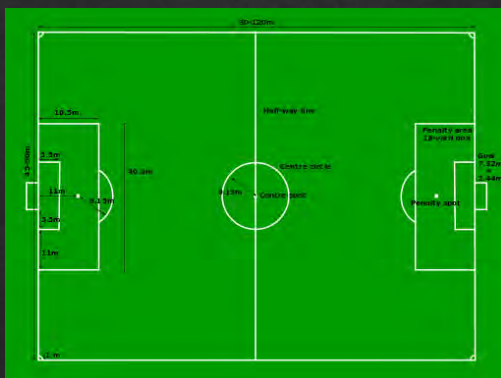


Mapping Objects

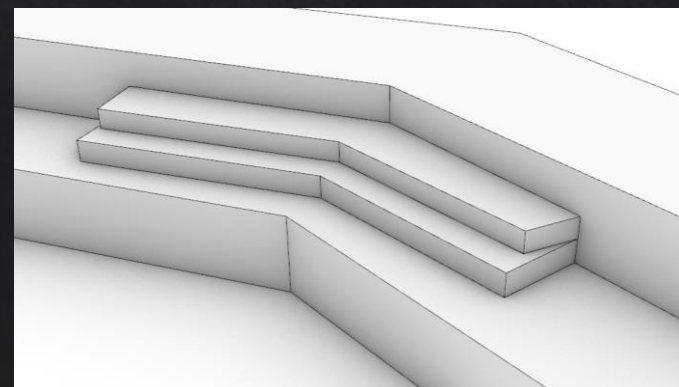
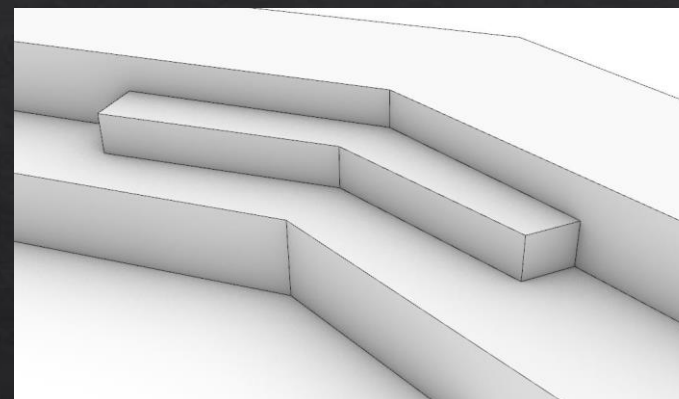


What decision making information can be communicated with Huginn

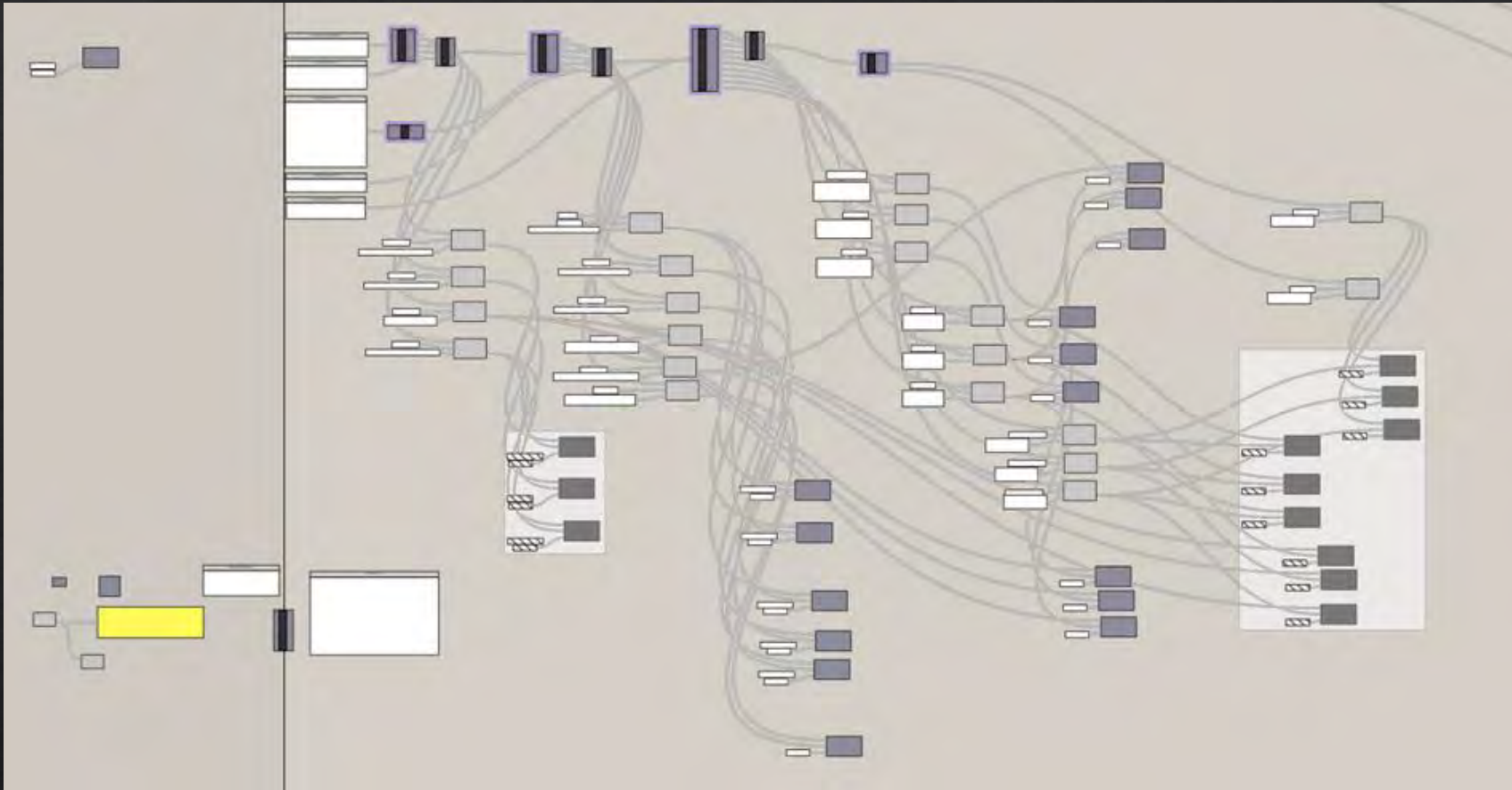
Human made:



Logic system:



Structure of the Grasshopper script



Results from Huginn

Centrelines: 2x Lines	Location of site: Defined by client
Grid_size: 15.3	Defined by the engineer due to column layout
Field_type: Soccer field	Defined by client
Field_dimensions: 110 x 75	FIFA international requirements
Field: Untrimmed surface	Shape defined by field type
Barrier_distance: 10	Barrier distance from field of play was kept at a minimum to reduce distance of spectators from the game but compromising room for services in this area
First_plat: 43x Brep	Barrier on the first riser is 400mm to avoid vision obstruction
Lower_bowl_riser_section: Closed Polyline	A C-Value of 0.085 was used for plat setout in lower bowl to balance reduced cost and size with quality sightlines
Suite_riser_section: Closed Polyline	A C-Value of 0.1 was used for plat setout to give suite seats a premium viewing experience
Suite_bowl_shape: 43x Brep	Pre-cast risers used to reduce construction costs
Aisle_width: 125	Set to be the minimum size still compliant with egress safety regulations to maximise space for seating
Suite_stairs: (1) 863x Brep	If plat step-up \geq 300mm, use 2 steps

ID	Parameter Value	Decision Making History:
Centrelines:	2x Lines	Location of site: Defined by client
Grid size:	15.3	Defined by the engineer due to column layout
Field type:	Soccer field	Defined by client
Field dimensions:	110 x 75	FIFA international requirements
Field:	Untrimmed surface	Shape defined by field type
Barrier distance:	10	Barrier distance from field of play was kept at a minimum to reduce distance of spectators from the game but compromising room for services in this area
First plat:	43x Brep	Barrier on the first riser is 400mm to avoid vision obstruction
Lower bowl riser section:	Closed Polyline	A C-Value of 0.085 was used for plat setout in lower bowl to balance reduced cost and size with quality sightlines
Suite riser section:	Closed Polyline	A C-Value of 0.1 was used for plat setout to give suite seats a premium viewing experience
Suite bowl shape:	43x Brep	Pre-cast risers used to reduce construction costs
Aisle width:	125	Set to be the minimum size still compliant with egress safety regulations to maximise space for seating
Suite stairs:	(1) 863x Brep	If plat step-up \geq 300mm, use 2 steps

Limitations to my research

1. It's very hard to synthesise decision making into succinct text

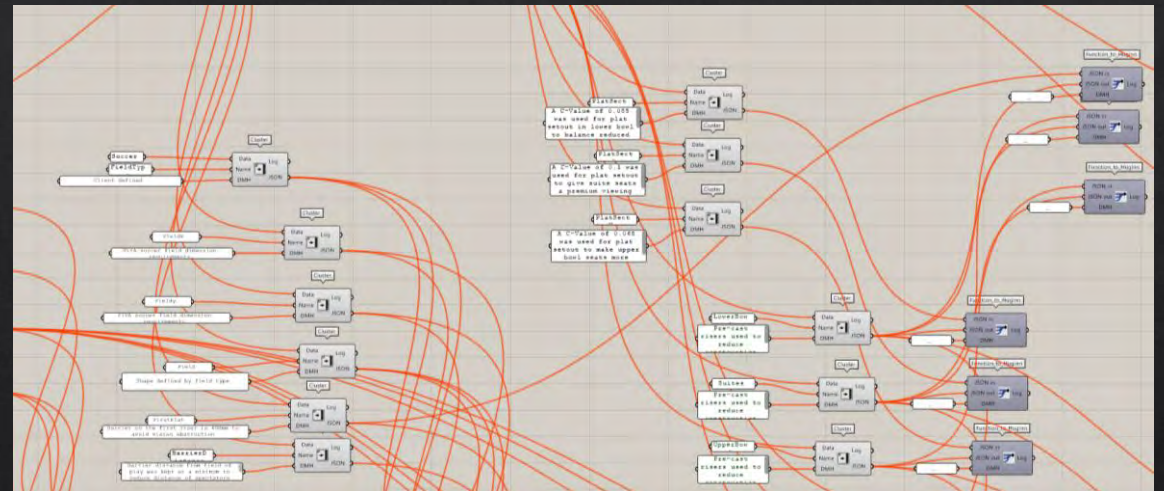


PlatSectionLowerBowl

A C-Value of 0.085 was used for plat setout in lower bowl to balance reduced cost and size with quality sightlines

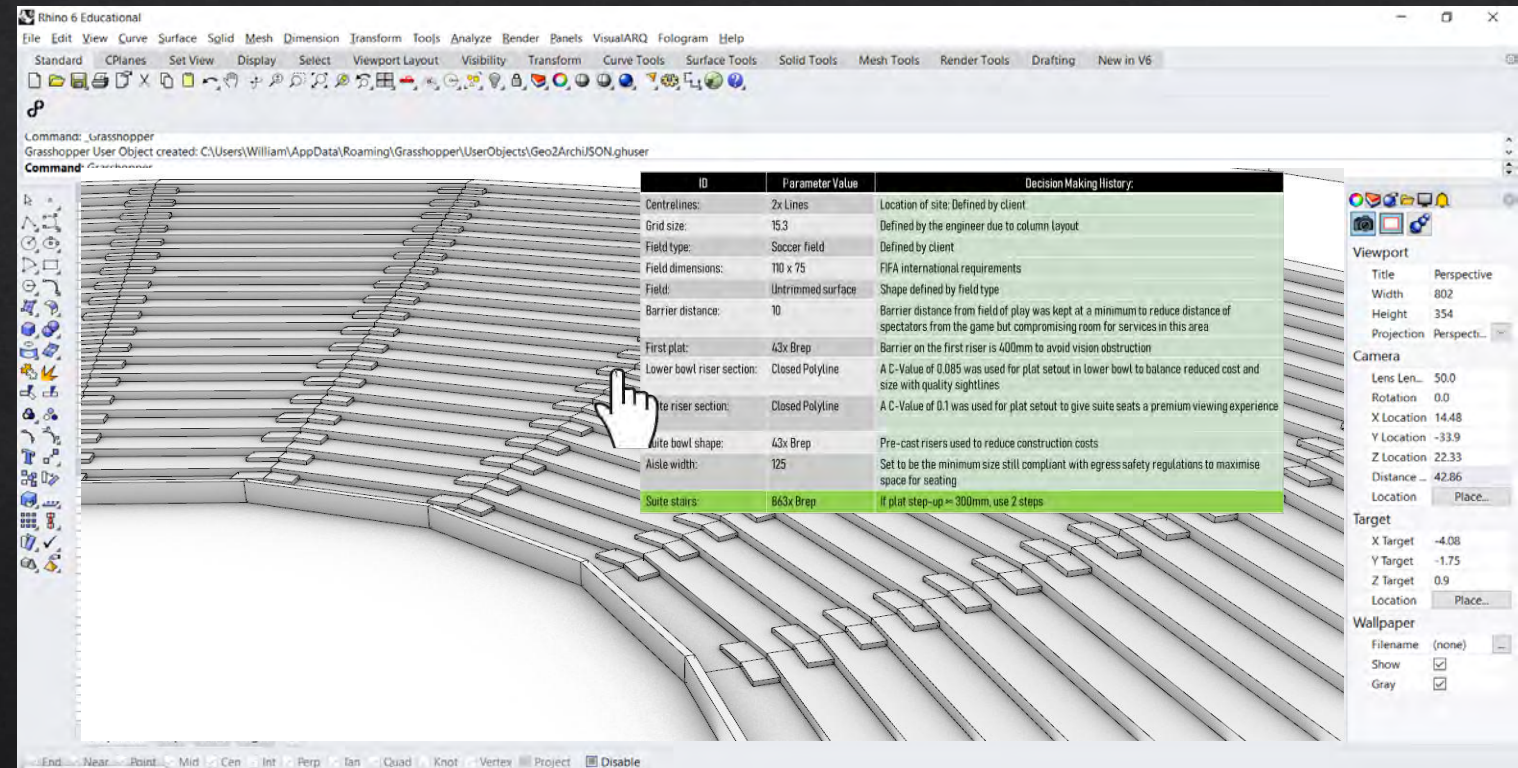
Limitations to my research

2. The current state of the workflow is time consuming and requires a change in approach to coding practice



Future research implications

1. Developing an interface for the data



Future research implications

2. More user friendly



Future research implications

3. User testing of usefulness in design practice



Future research implications

4. Explore cross firm utilisation for accountability checking

