Synesthesia

An Exploration of Architectural Experience as Expressed by Music

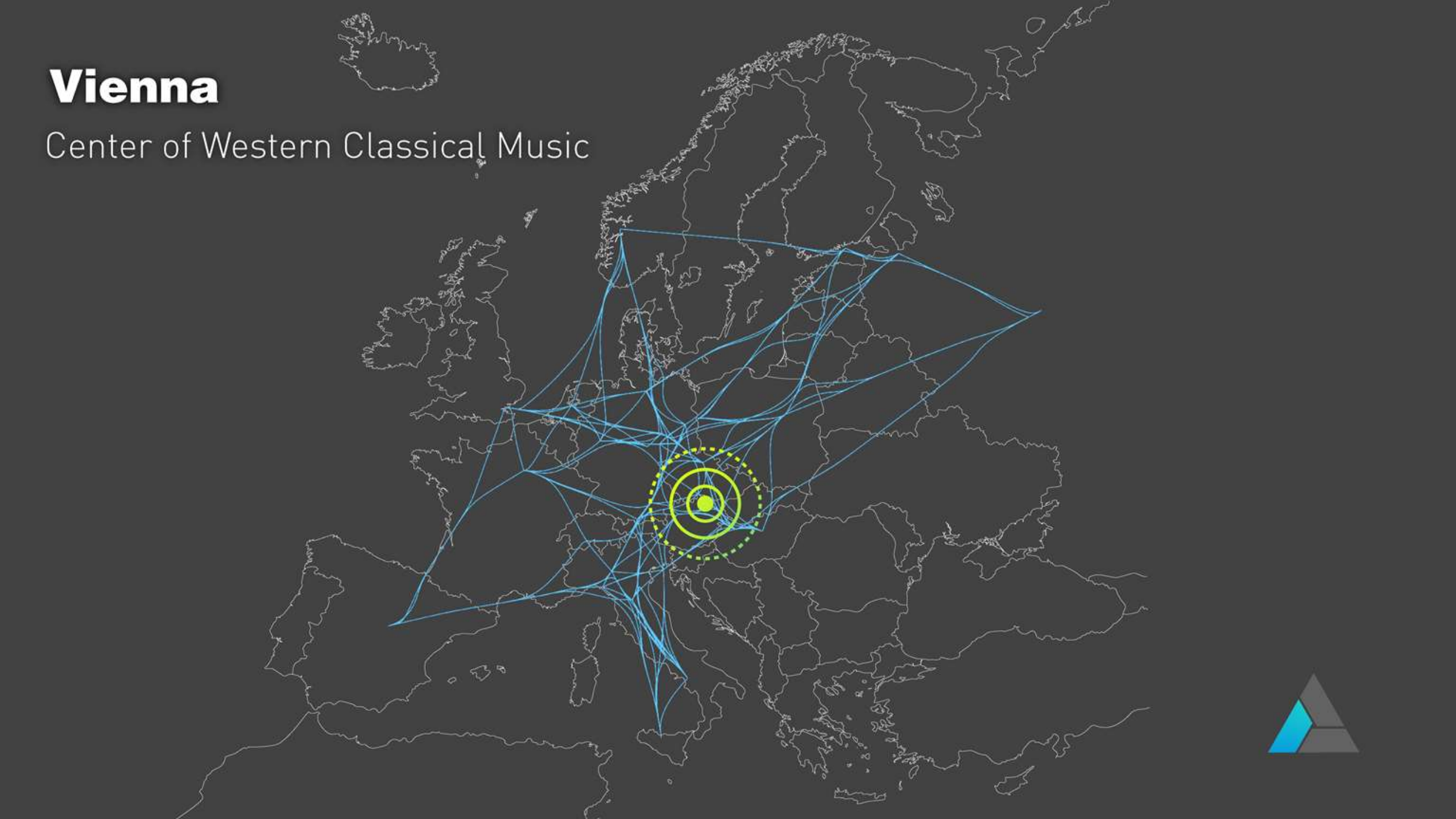
P5 Presentation by Roel Westrik

Henriette Bier
Sina Mostafavi
Ferry Adema

25-06-2019

Vienna

Center of Western Classical Music



Vienna

Haus der Industrie

References:

Picture: Radovan Bitarovsky, flickr.com, 2016

Vienna

Arena Wien

References:

Manfred Werner, de.wikipedia.org, 2011

Vienna

Haus der Industrie

References:

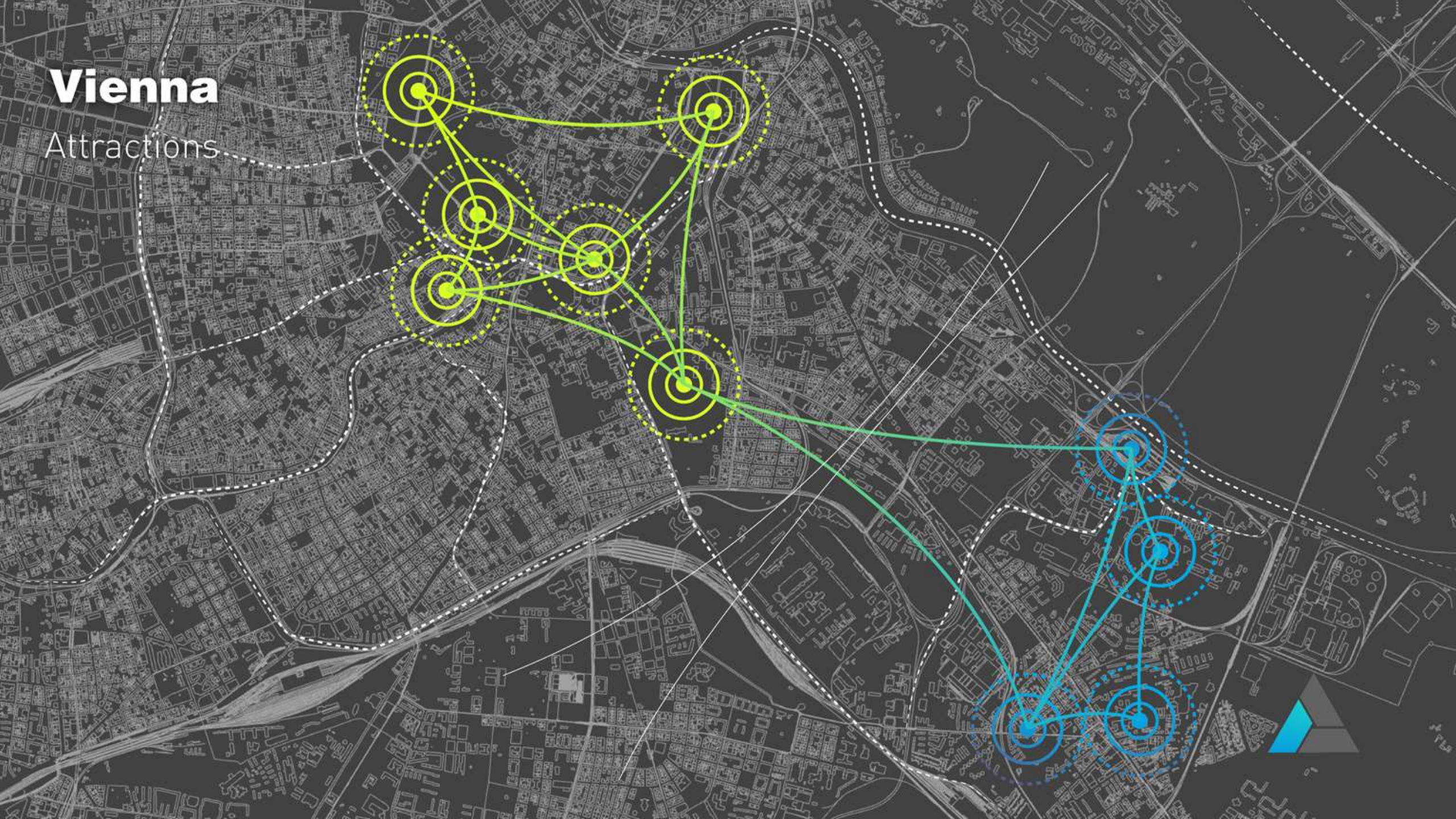
Picture: Rainer / Garde, diegarde.at, 2017

Vienna

Arena Wien

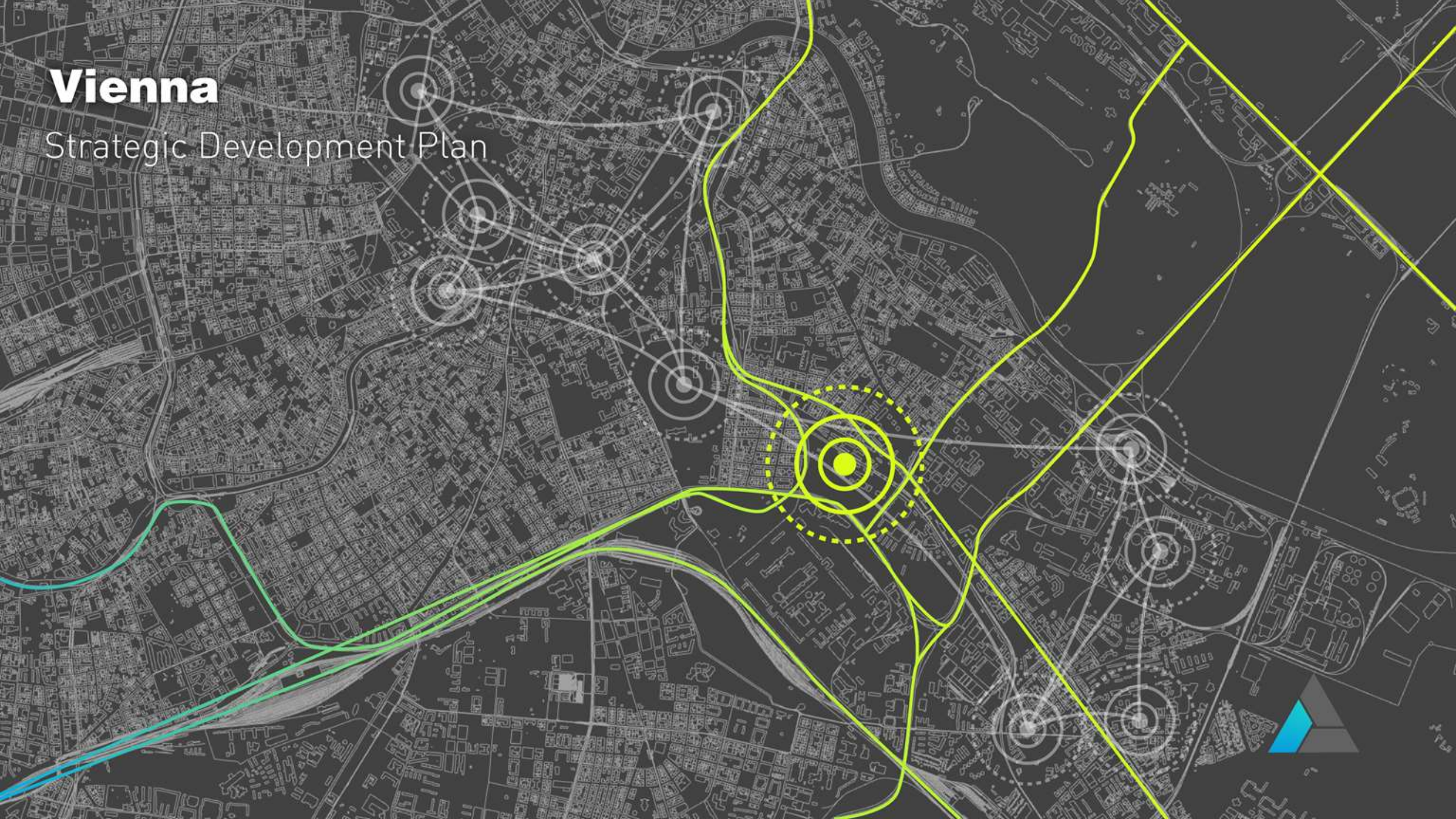
References:

Manfred Werner, de.wikipedia.org, 2011


Vienna
Attractions

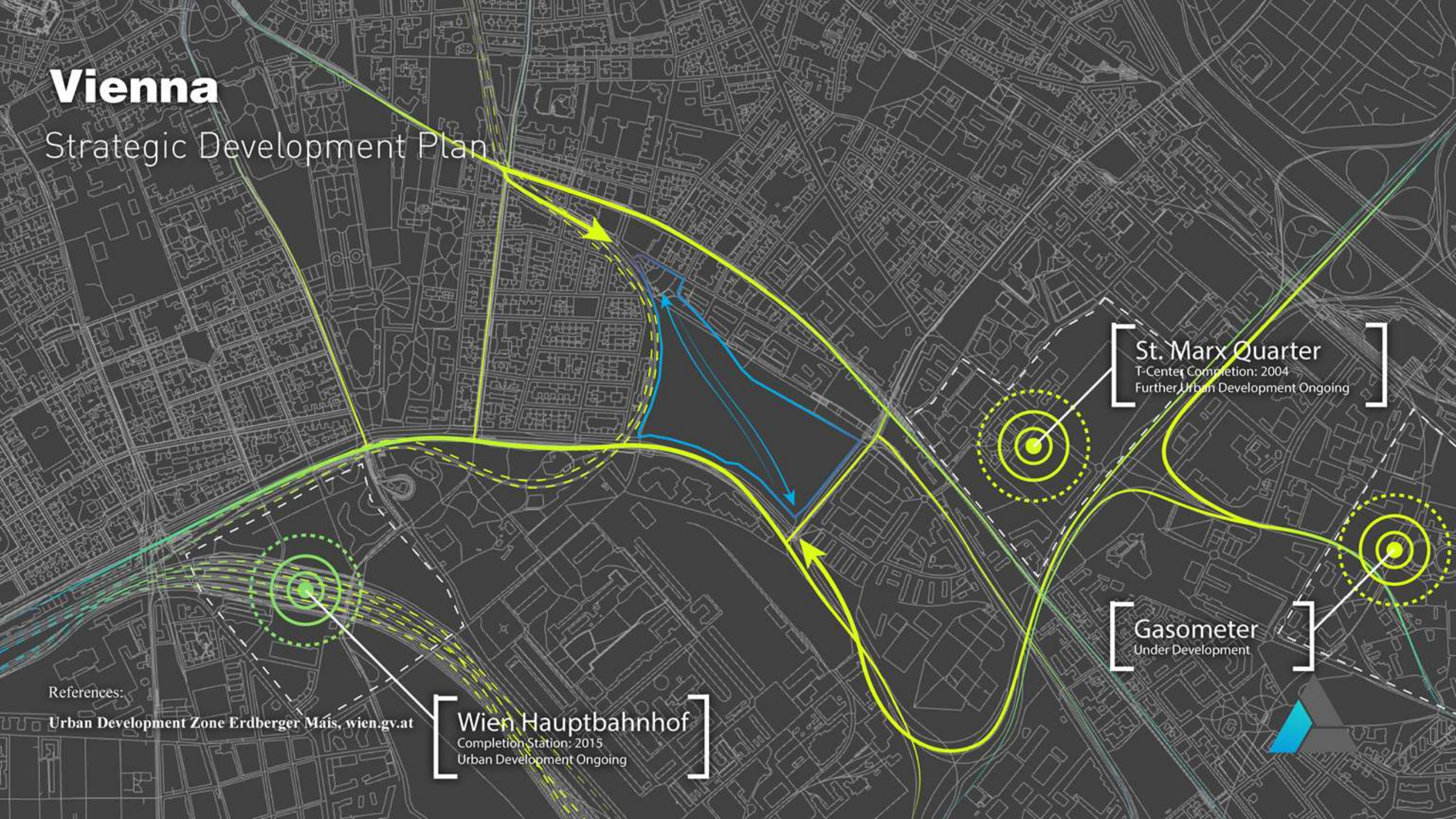
Vienna

Strategic Development Plan



Vienna

Strategic Development Plan

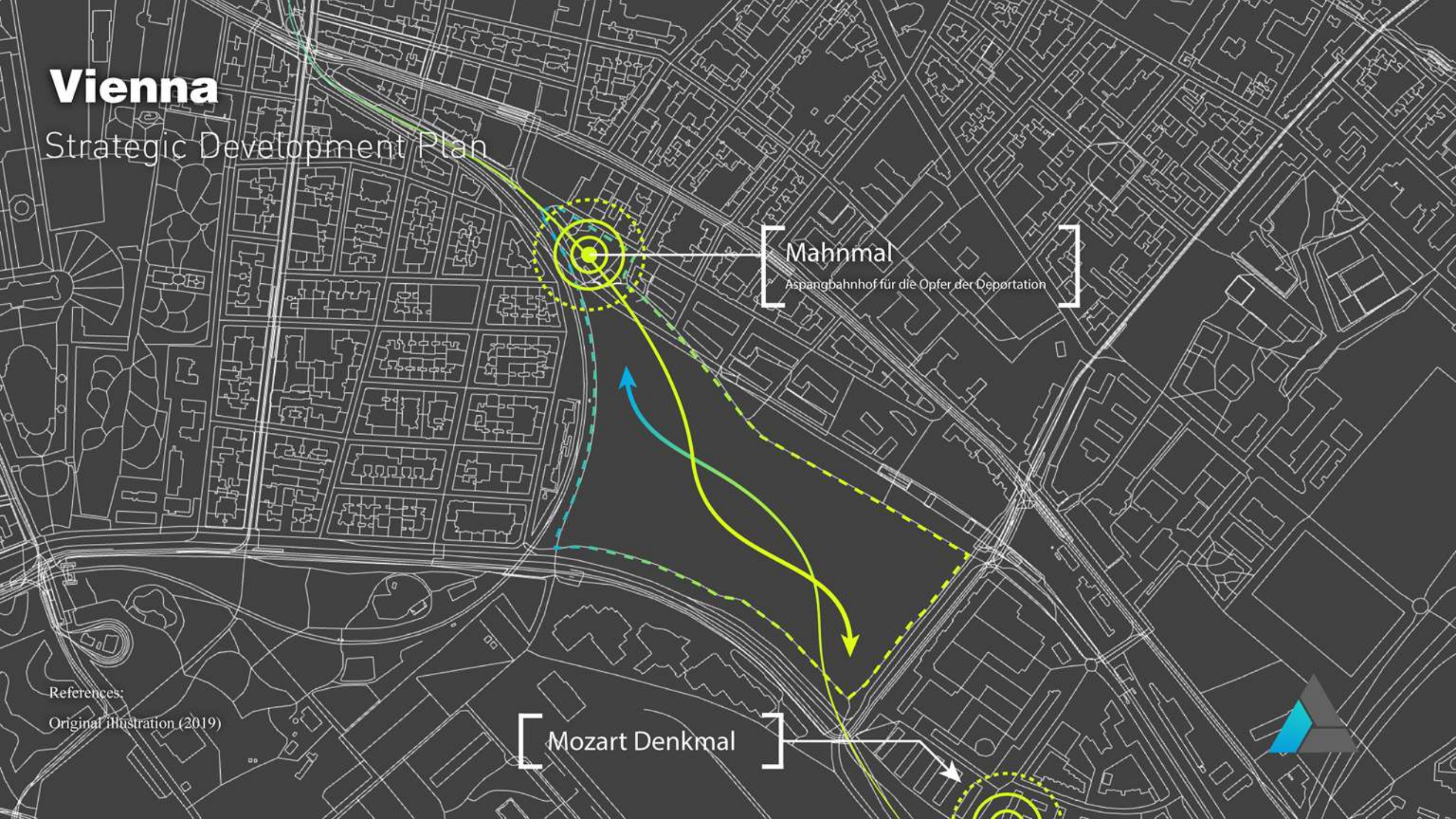


References:

Urban Development Zone Erdberger Mais, wien.gv.at

Vienna

Strategic Development Plan



References:

Original illustration (2019)

Maurice Ravel - La Valse

poème chorégraphique pour orchestre

References:

unknown, bartokfesztival.hu/, n.d.

Maurice Ravel - La Valse

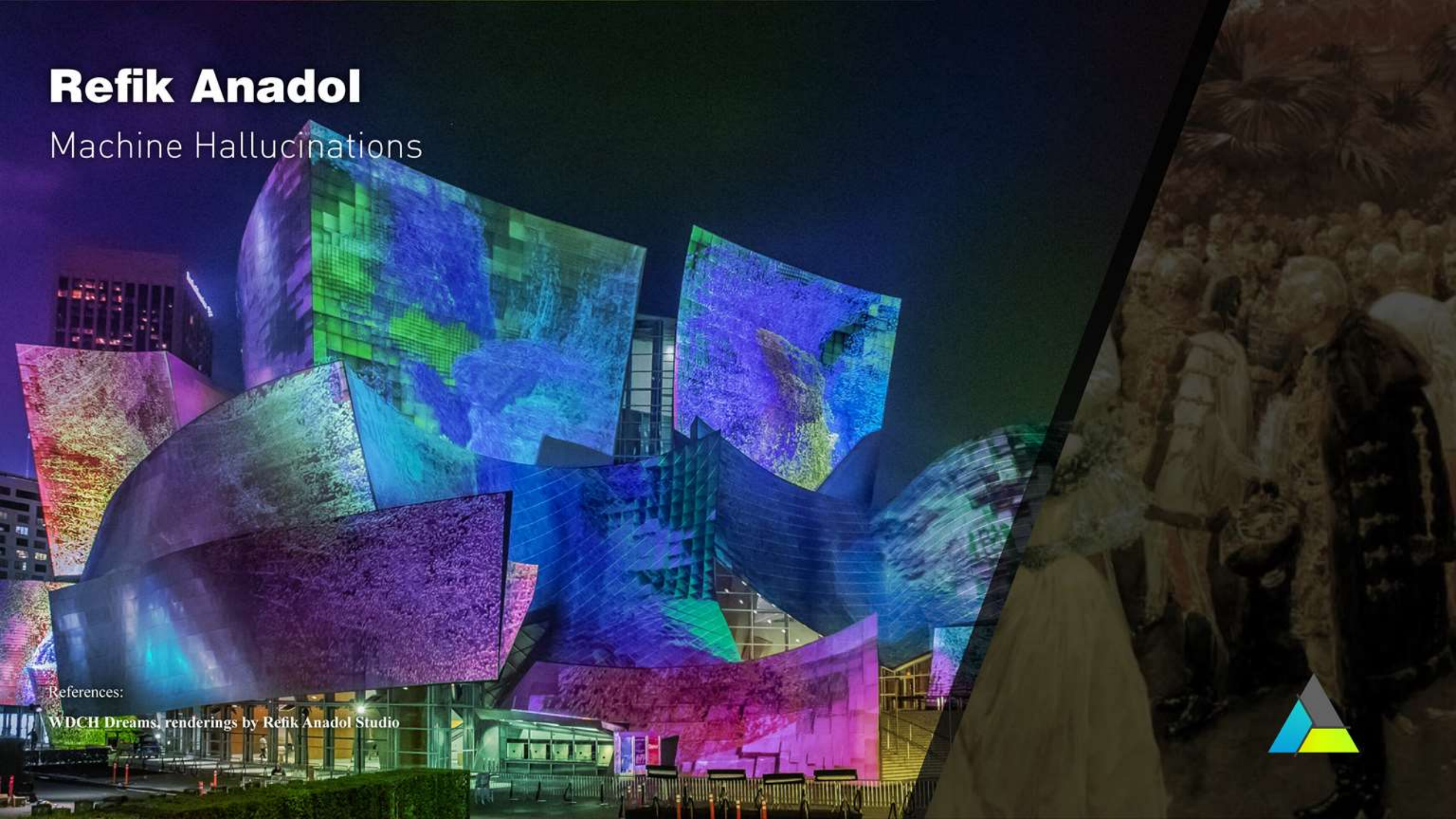
poème chorégraphique pour orchestre

References:

Wilhelm Gause, Hofball in Wien (Court Ball in Wien)

Refik Anadol

Machine Hallucinations



References:

WDCH Dreams, renderings by Refik Anadol Studio

Refik Anadol

Machine Hallucinations

References:

refikanadol.com, renderings by Refik Anadol Studio

Refik Anadol

Machine Hallucinations

References:

Andy Smith, hifructose.com, 2018

Data Flow and Strategy

Data Processing

References:

Original illustration (2019)

Data Flow and Strategy

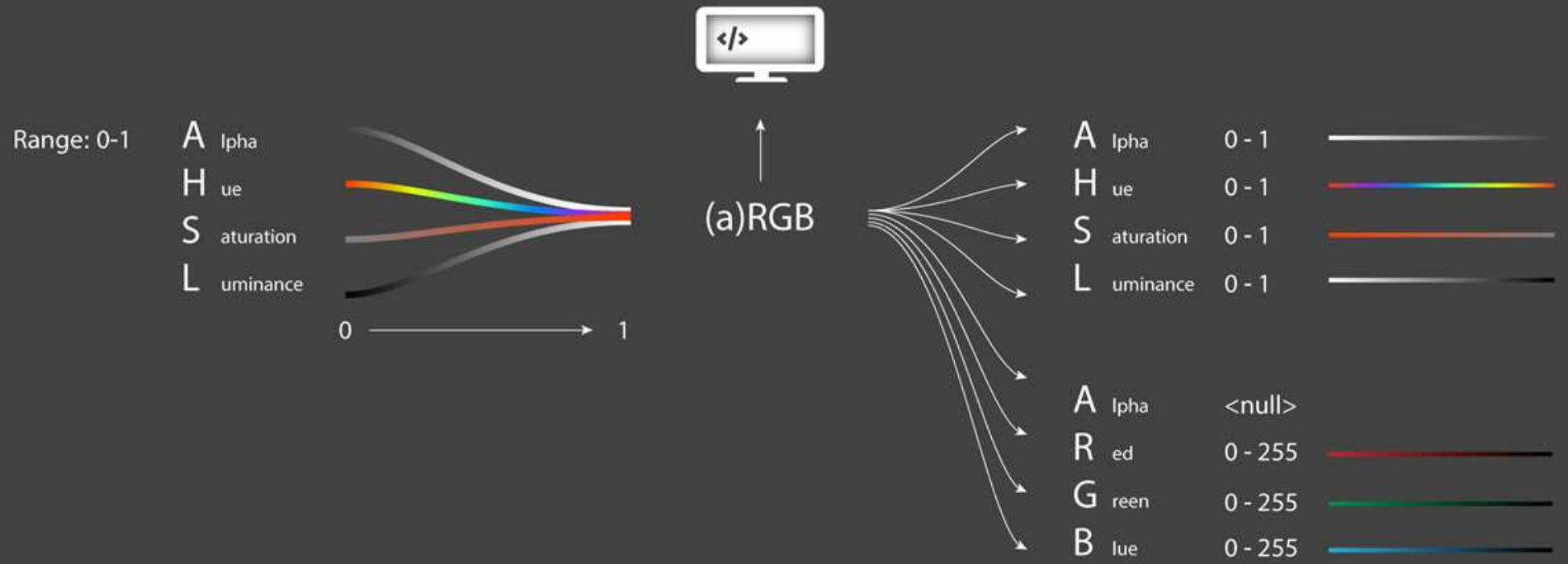
Data Processing

References:

Original illustration (2019)

Data Flow and Strategy

AHSV Colour Space - 4D Data storage



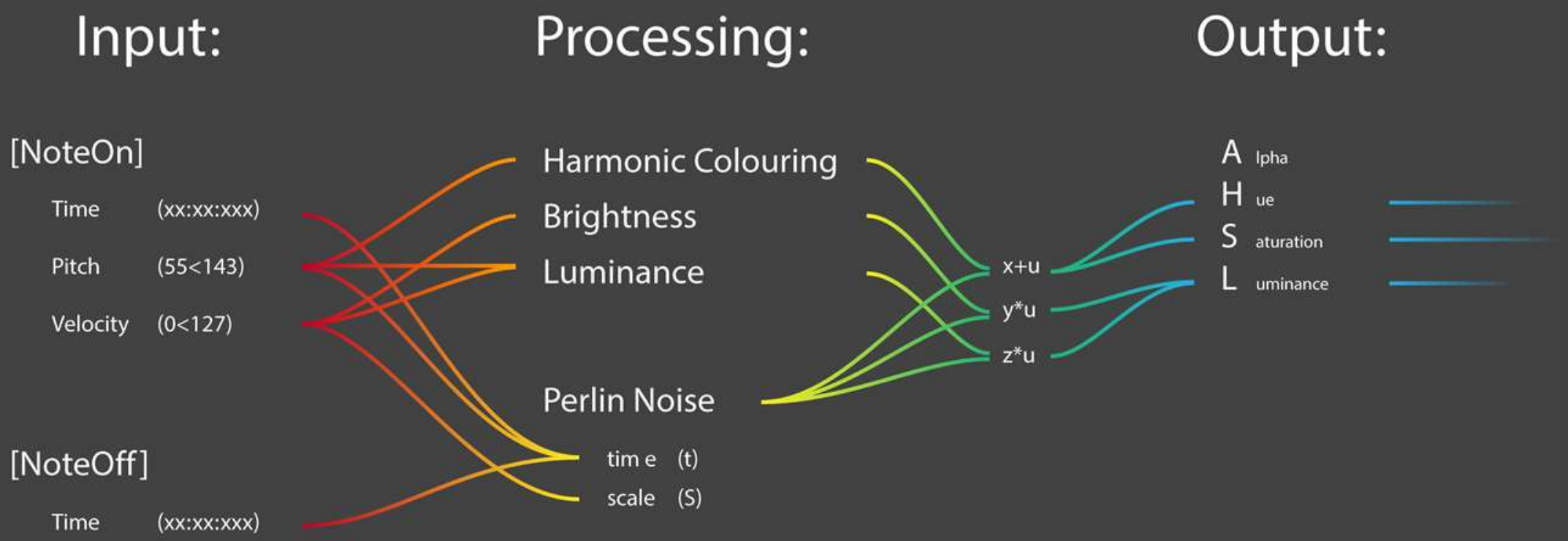
References:

Visual and Aural: Visualization of Harmony in Music with Colour, B. Klemenc et al. (2011)

Original illustration (2019)

Data Flow and Strategy

Musical input and processing



References:

Original illustration (2019)

Data Flow and Strategy

Musical input and processing

Input:

[NoteOn]

Time (xx:xx:xxx)

Pitch (55<143)

Velocity (0<127)

[NoteOff]

Time (xx:xx:xxx)

Processing:

Harmonic Colouring

Brightness

Luminance

Perlin Noise

tim e (t)

scale (S)

x+u

y*u

z*u

Output:

Alpha

Hue

Saturation

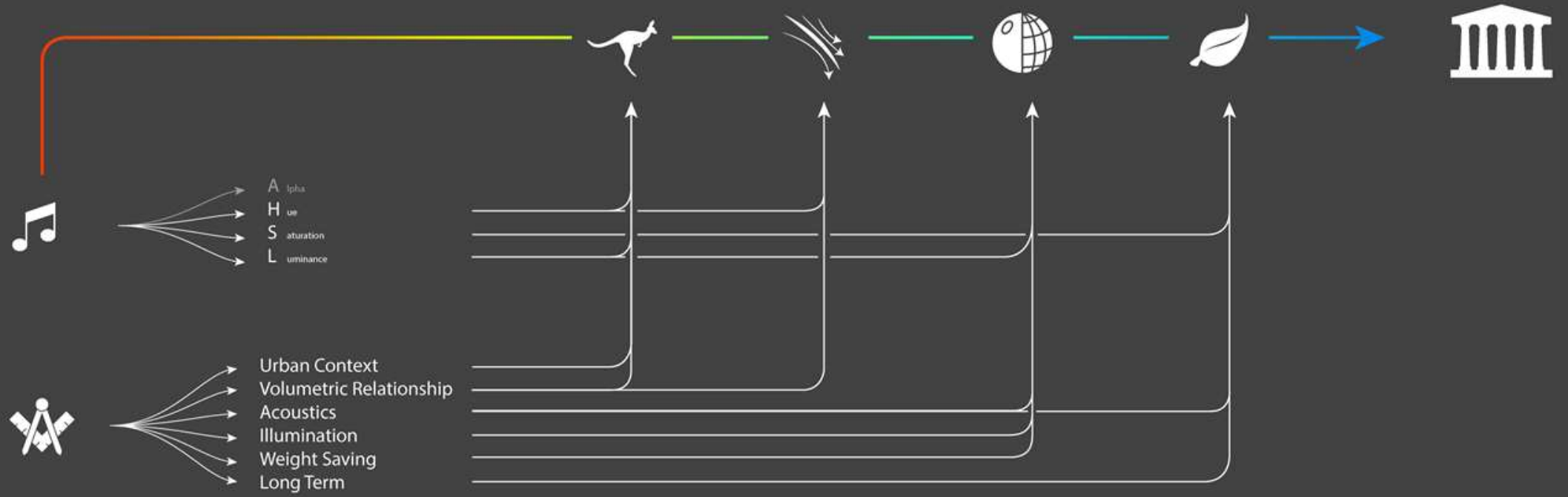
Luminance

References:

Original illustration (2019)

Data Flow and Strategy

Architectural Input

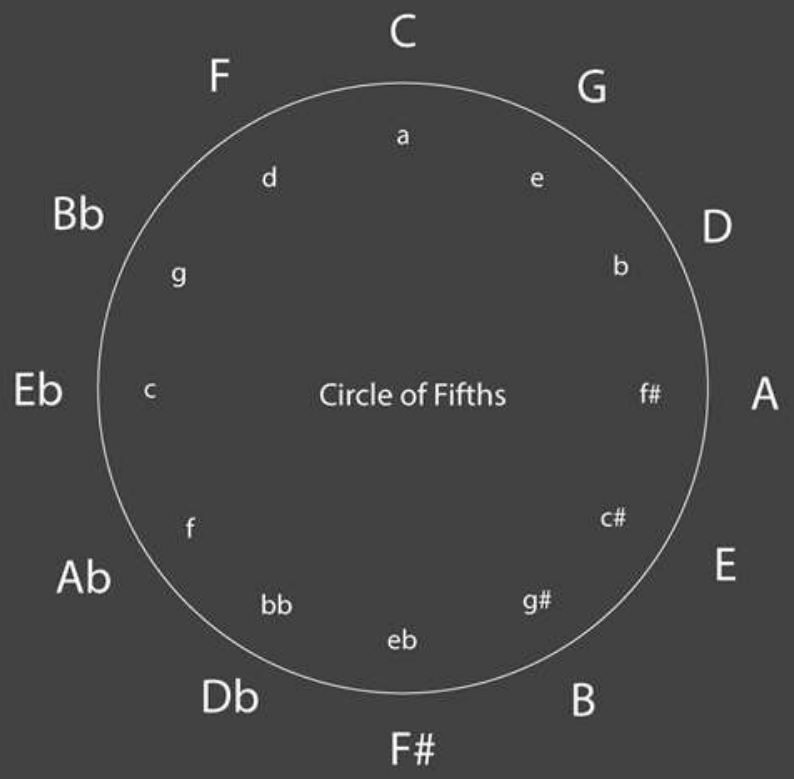


References:

Original illustration (2019)

Harmonic Coloring

A lpha
H ue
S aturation
L uminance



References:

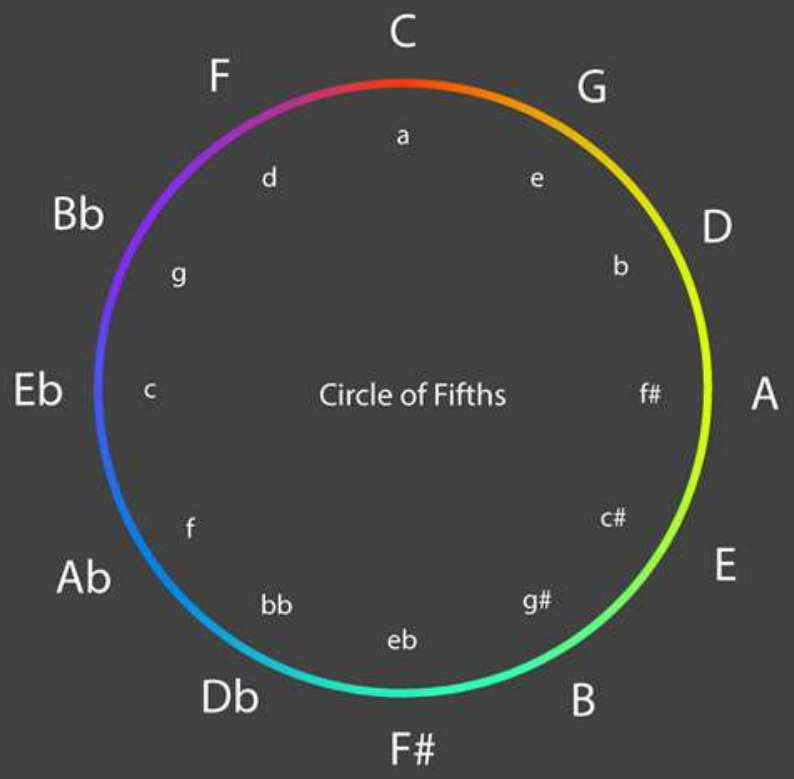
Visual and Aural: Visualization of Harmony in Music with Colour, B. Klemenc et al. (2011)

Prometheus: The Poem of Fire (op. 60), A. Scriabin (1910)

Original illustration (2019)

Harmonic Coloring

A lpha
H ue
S aturation
L uminance



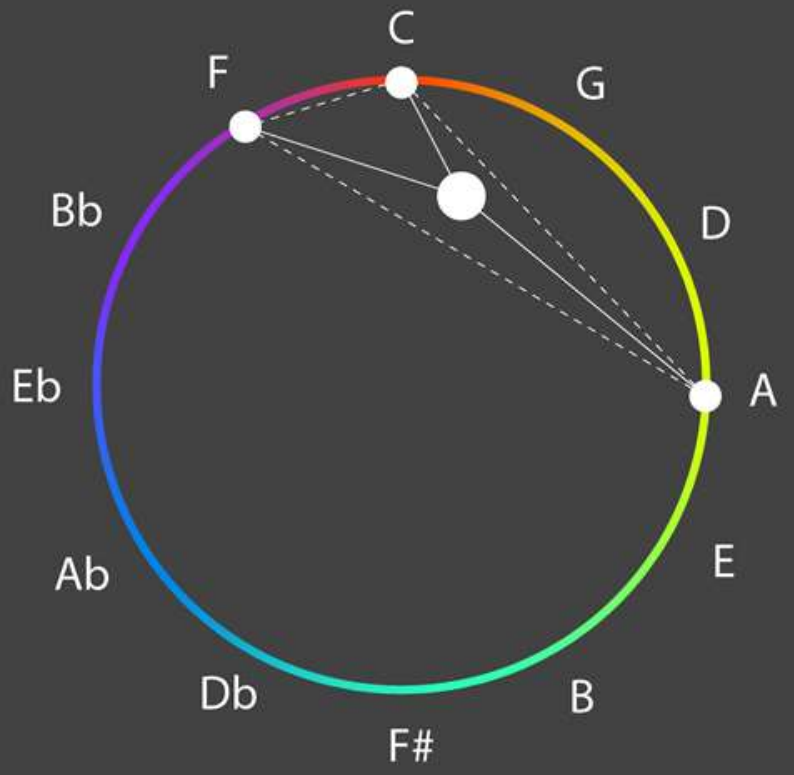
References:

Visual and Aural: Visualization of Harmony in Music with Colour, B. Klemenc et al. (2011)

Prometheus: The Poem of Fire (op. 60), A. Scriabin (1910)

Original illustration (2019)

Harmonic Coloring



F major

Alpha

Hue

Saturation

Lumination

Alpha

Hue

Saturation

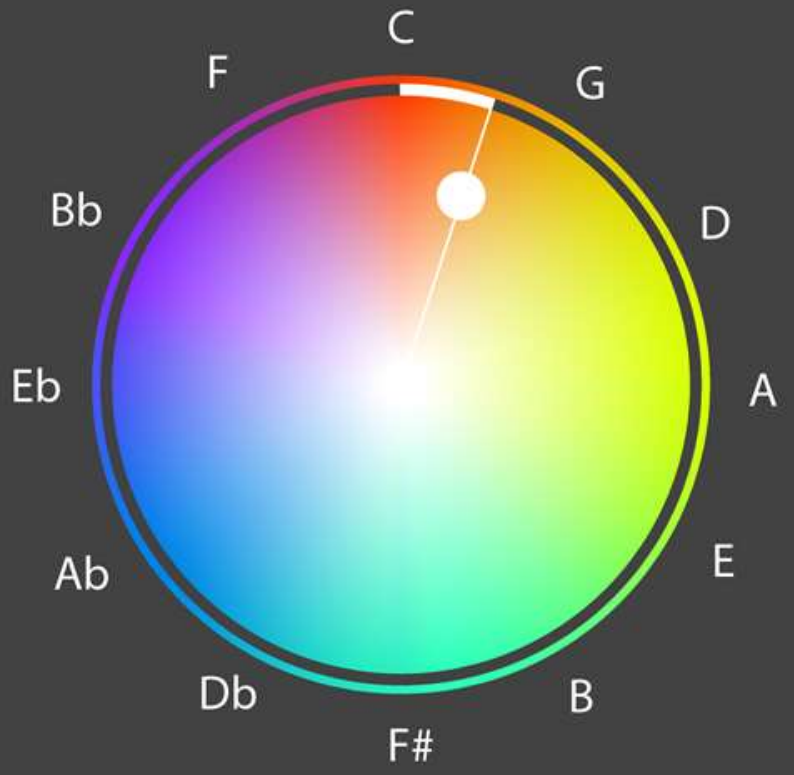
Luminance

References:

Visual and Aural: Visualization of Harmony in Music with Colour, B. Klemenc et al. (2011)

Original illustration (2019)

Harmonic Coloring



Alpha
Hue
Saturation
Luminance

F major

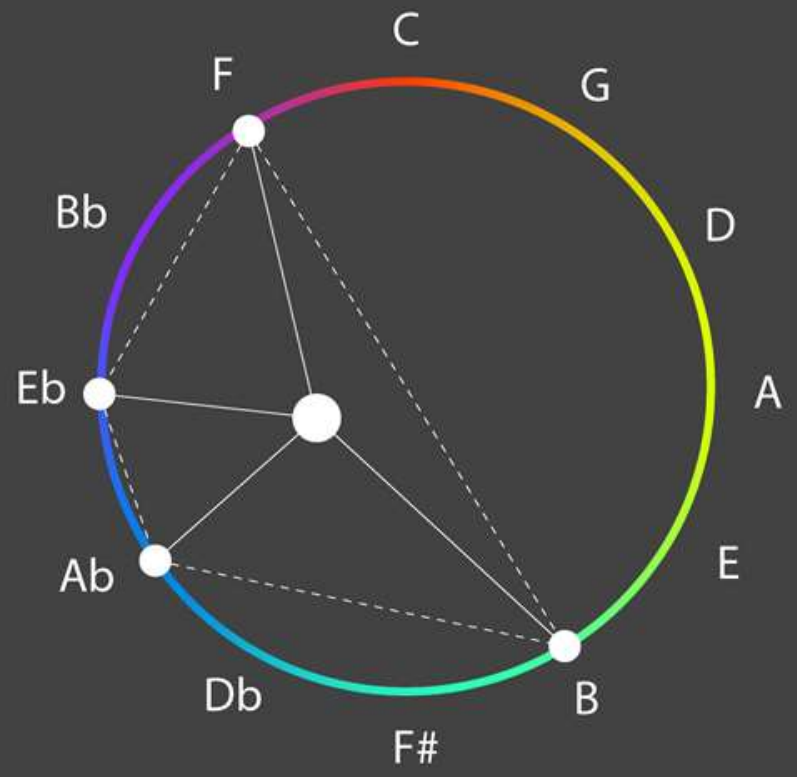
Alpha	100%
Hue	0.06
Saturation	0.85
Lumination	1.0

References:

Visual and Aural: Visualization of Harmony in Music with Colour, B. Klemenc et al. (2011)

Original illustration (2019)

Harmonic Coloring



Fm dim+#6

Alpha

Hue

Saturation

Lumination

Alpha

Hue

Saturation

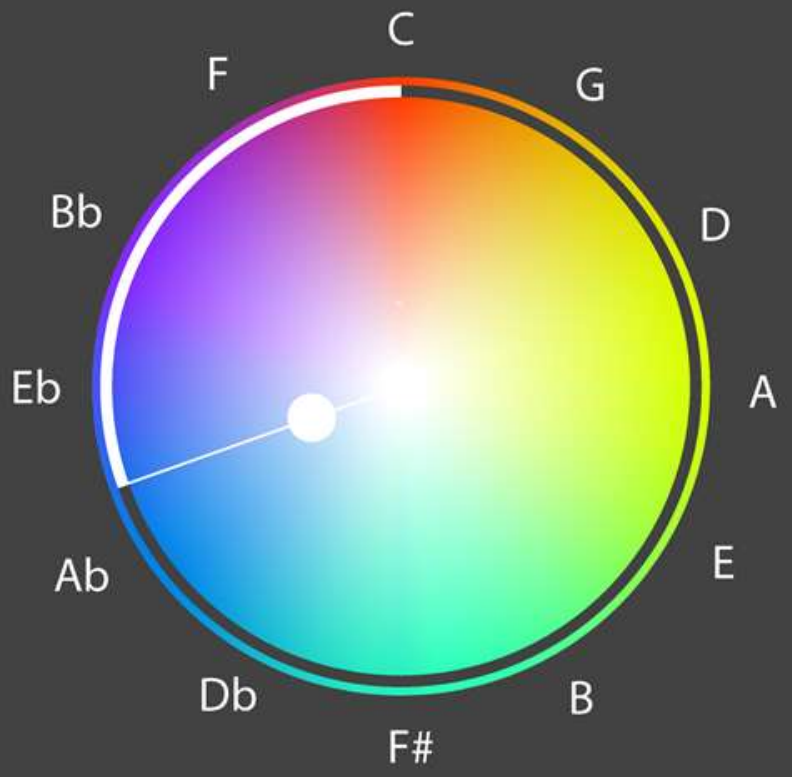
Luminance

References:

Visual and Aural: Visualization of Harmony in Music with Colour, B. Klemenc et al. (2011)

Original illustration (2019)

Harmonic Coloring



Alpha
Hue
Saturation
Luminance

Fm dim+#6

Alpha	100%
Hue	0.72
Saturation	0.15
Lumination	1.0

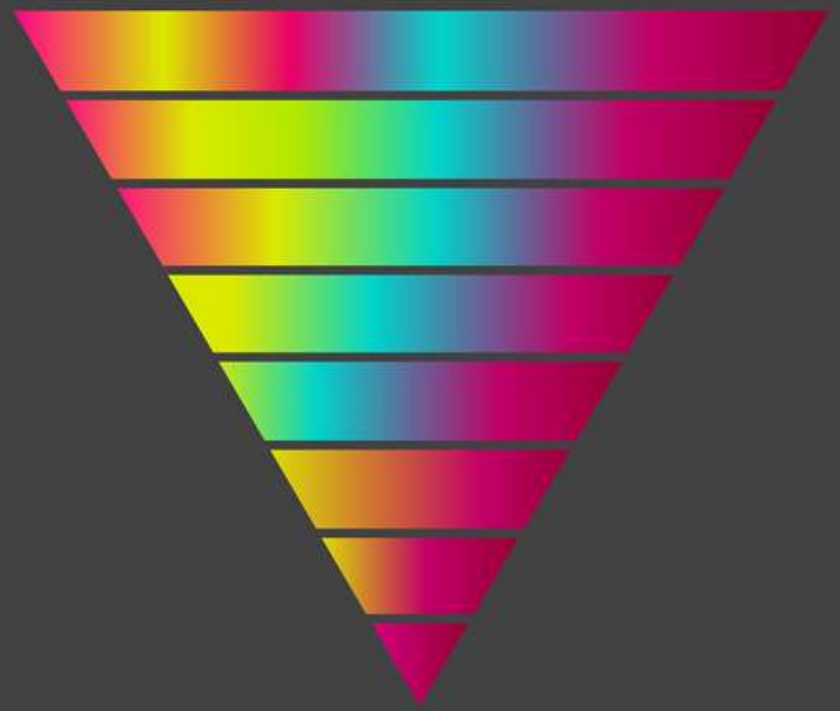
References:

Visual and Aural: Visualization of Harmony in Music with Colour, B. Klemenc et al. (2011)

Original illustration (2019)

Harmonic Coloring

A Ipha
H ue
S aturation
L uminance



N Groups:

n=128

-

n=64

-

n=32

-

n=16

-

n=8

-

n=4

-

n=2

-

n=1

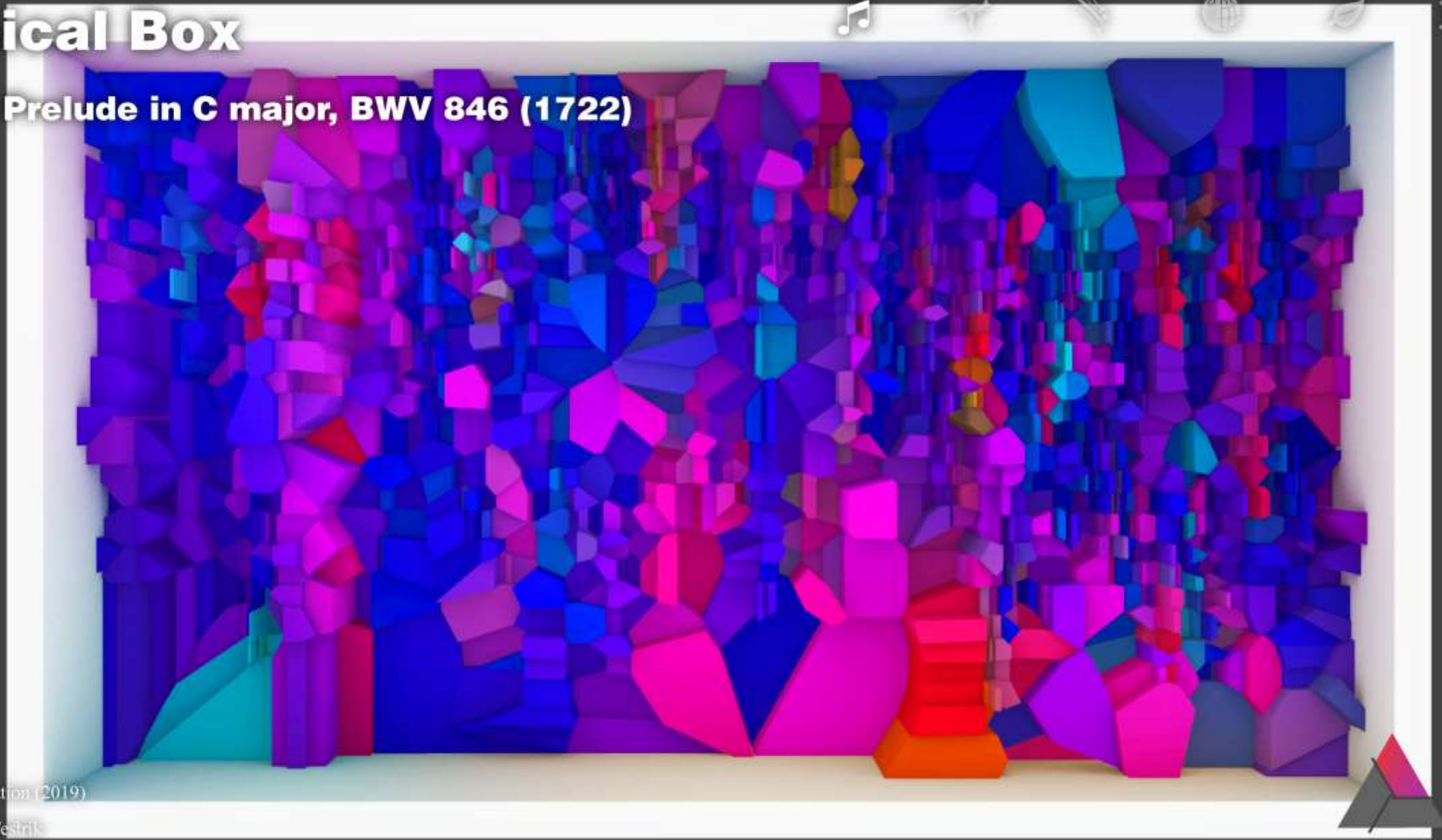
References:

Harmonic Visualizations of Tonal Music, C.S. Sapp (2001)

Original illustration (2019)

Musical Box

Bach - Prelude in C major, BWV 846 (1722)



References:

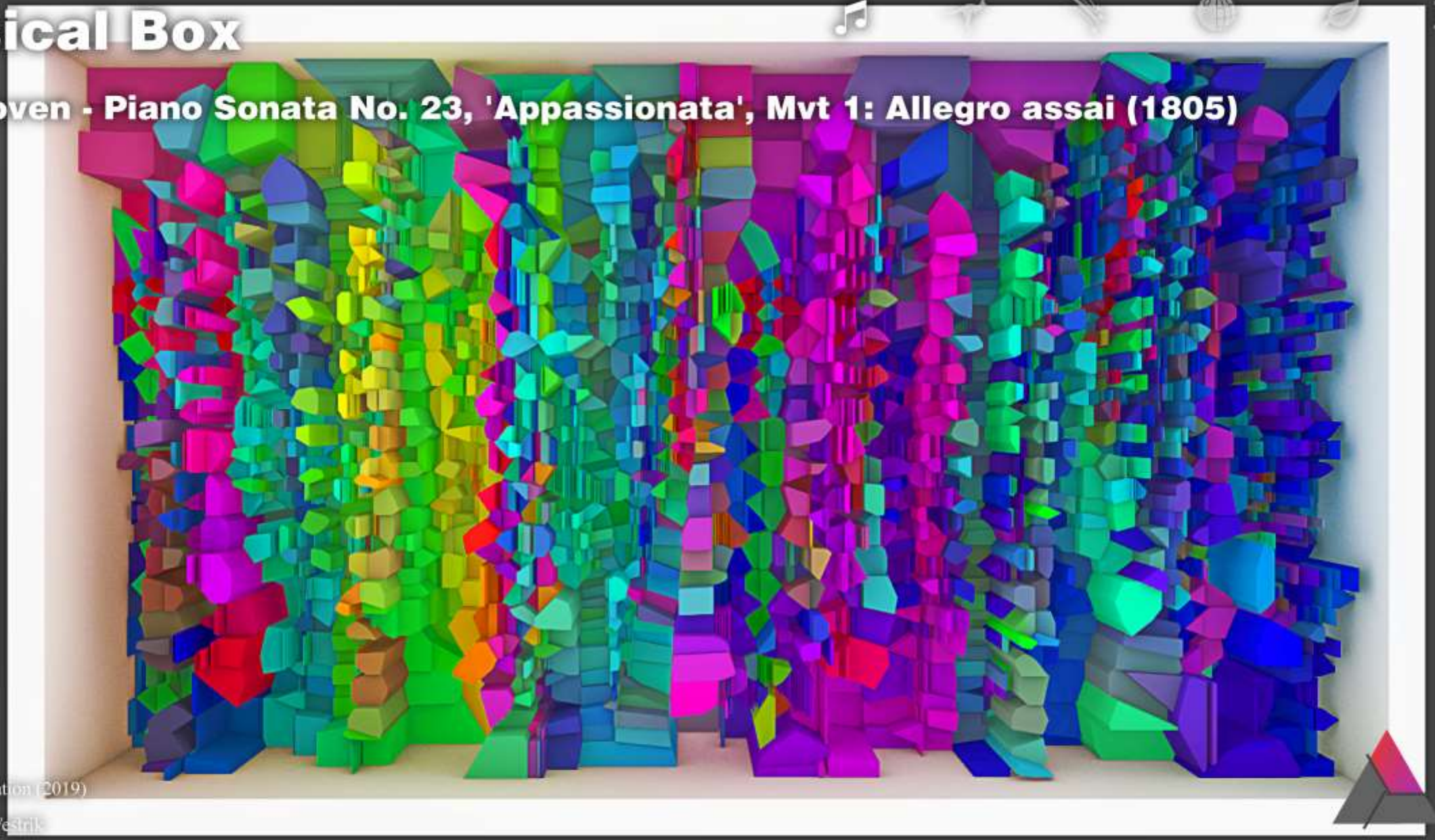
Original illustration (2019)

Design: Roel Westrik

Tutor: H.H. Bier

Musical Box

Beethoven - Piano Sonata No. 23, 'Appassionata', Mvt 1: Allegro assai (1805)



References:

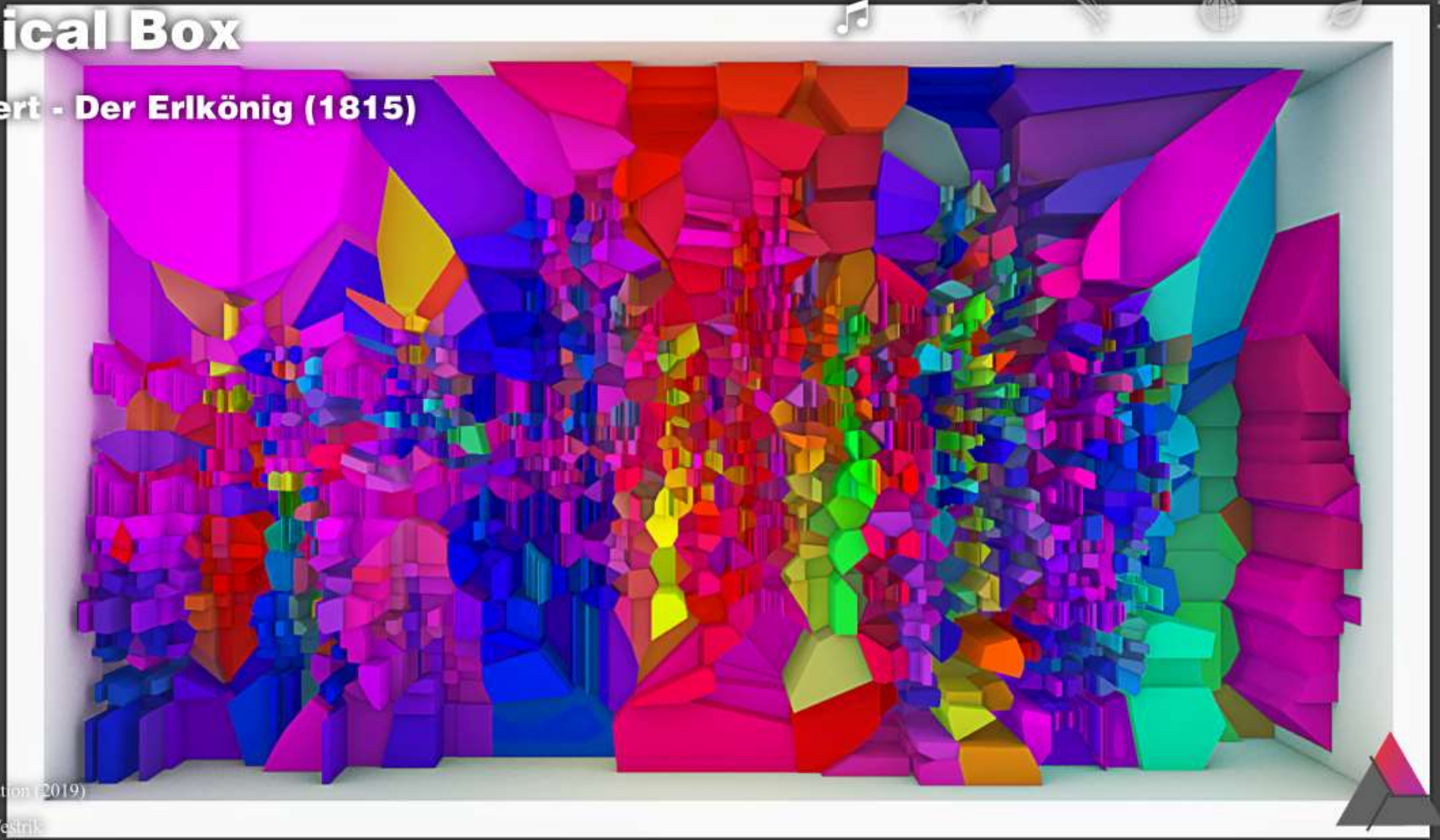
Original illustration (2019)

Design: Roel Westrik

Tutor: H.H. Bier

Musical Box

Schubert - Der Erlkönig (1815)



References:

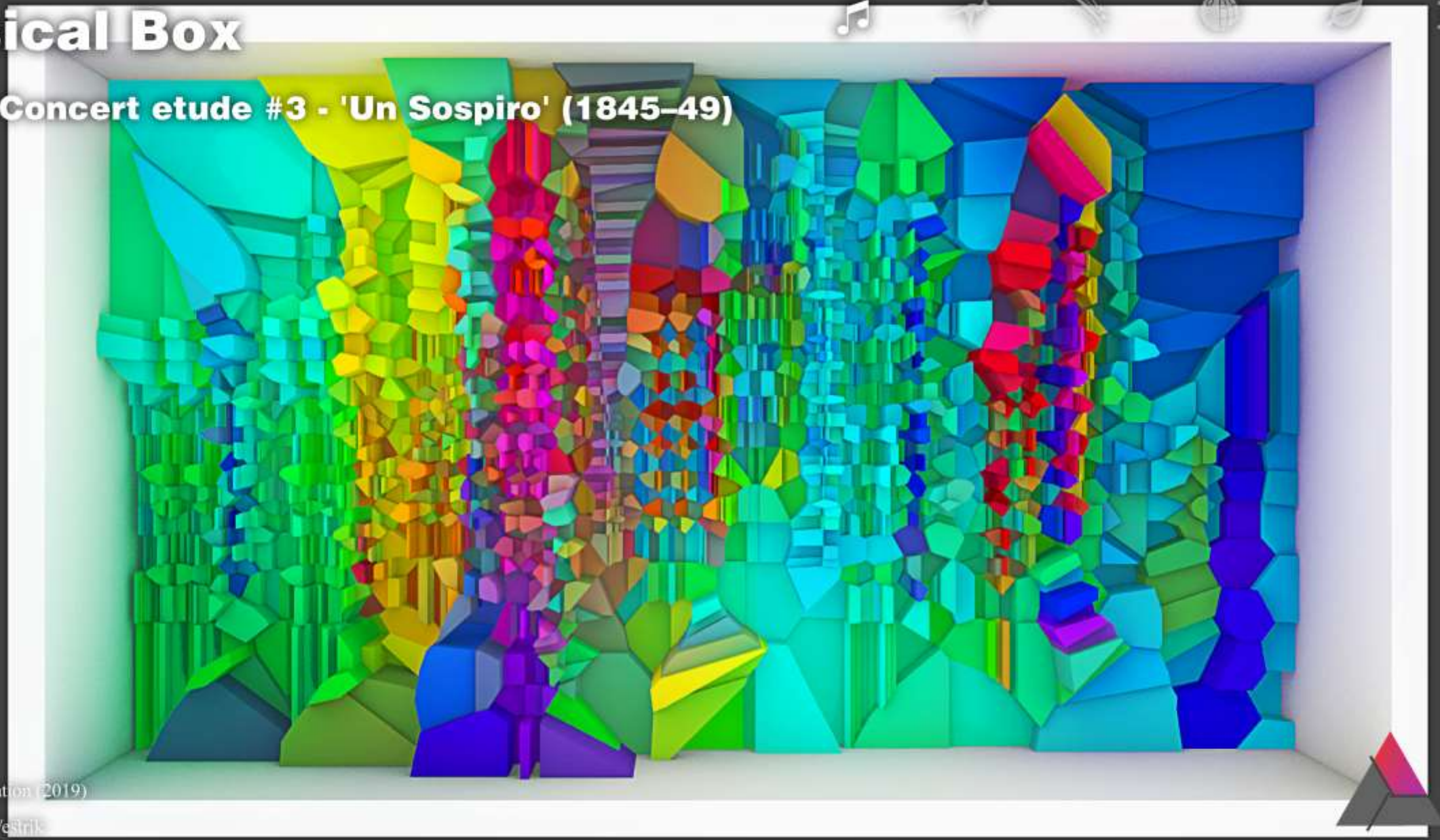
Original illustration (2019)

Design: Roel Westrik

Tutor: H.H. Bier

Musical Box

Liszt - Concert etude #3 - 'Un Sospiro' (1845–49)



References:

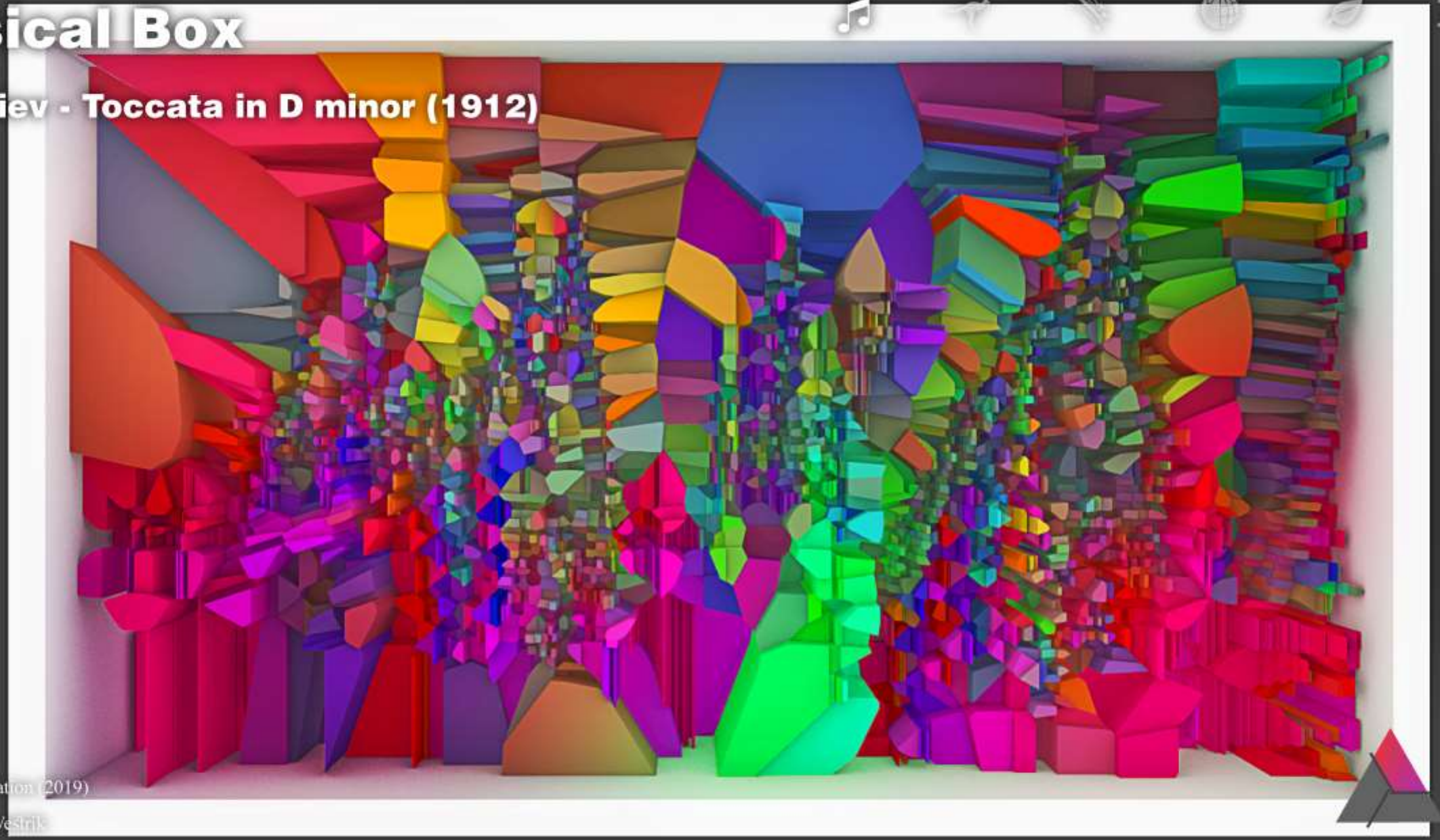
Original illustration (2019)

Design: Roel Westrik

Tutor: H.H. Bier

Musical Box

Prokofiev - Toccata in D minor (1912)



References:

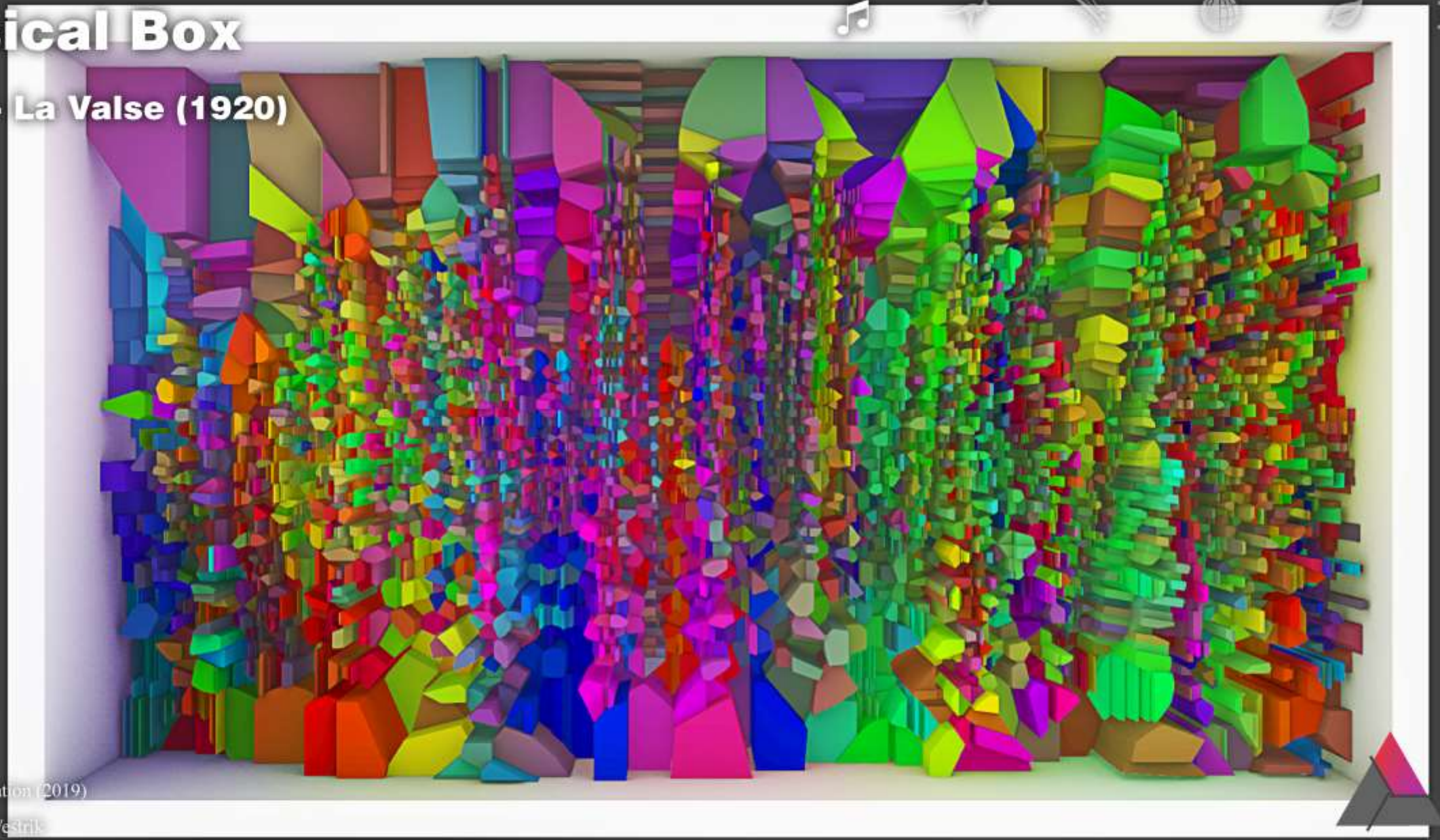
Original illustration (2019)

Design: Roel Westrik

Tutor: H.H. Bier

Musical Box

Ravel - La Valse (1920)



References:

Original illustration (2019)

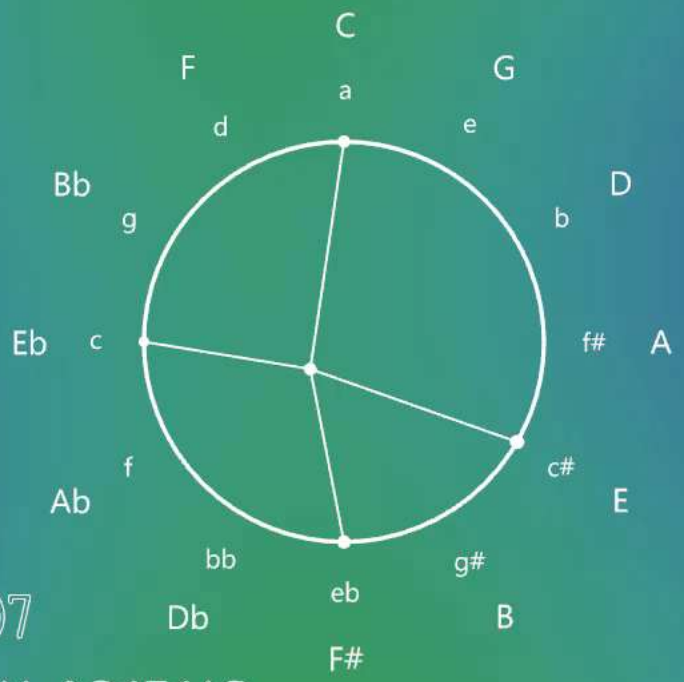
Design: Roel Westrik

Tutor: H.H. Bier

Visualization Study #1

Harmonic Coloring

Alpha
Hue
Saturation
Luminance



HUE: 0.513207

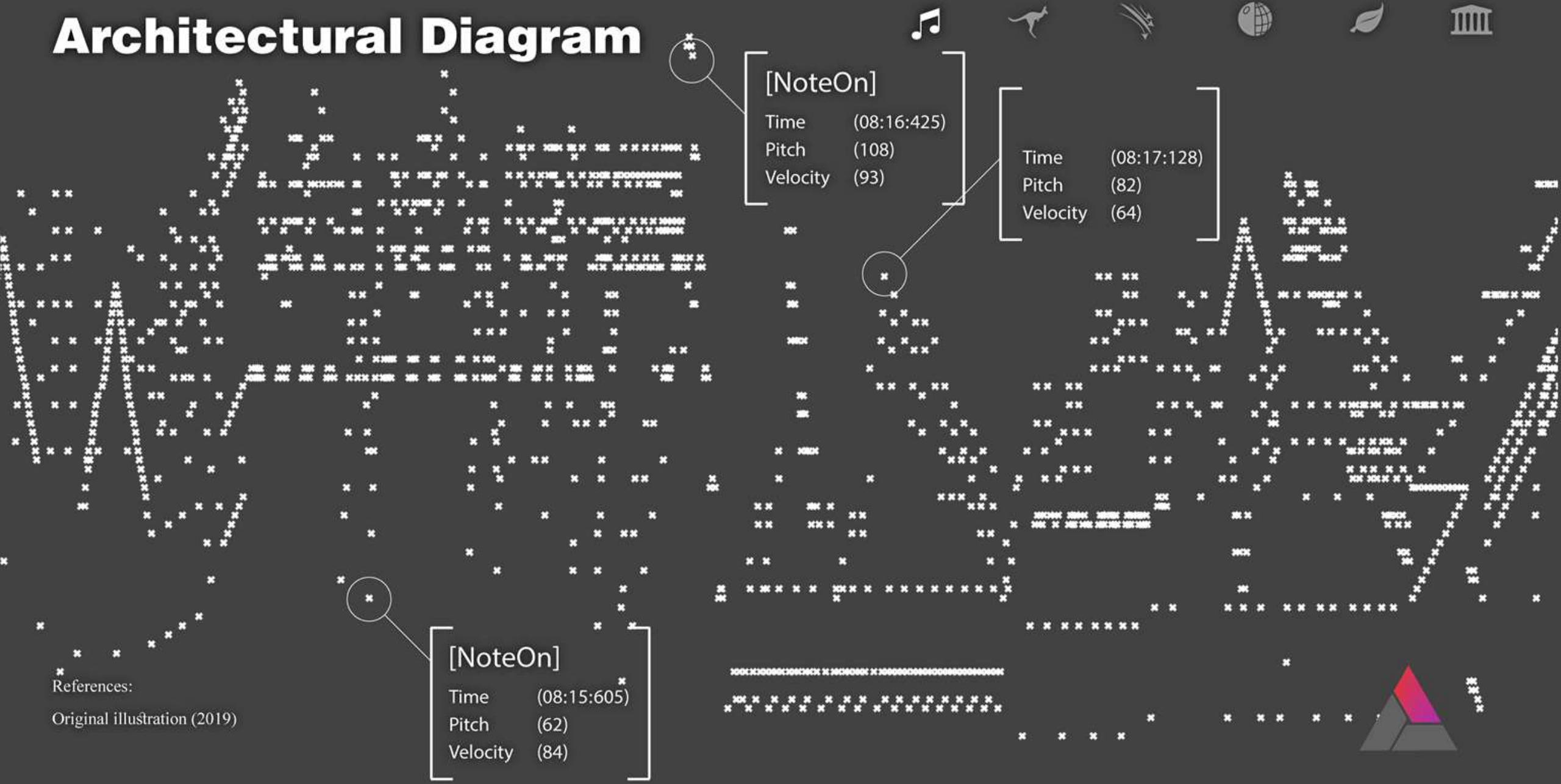
SATURATION: 0.365643

LUMINANCE: 0.468188

References:

Original illustration (2019)

Architectural Diagram



References:

Original illustration (2019)

Architectural Diagram

References:

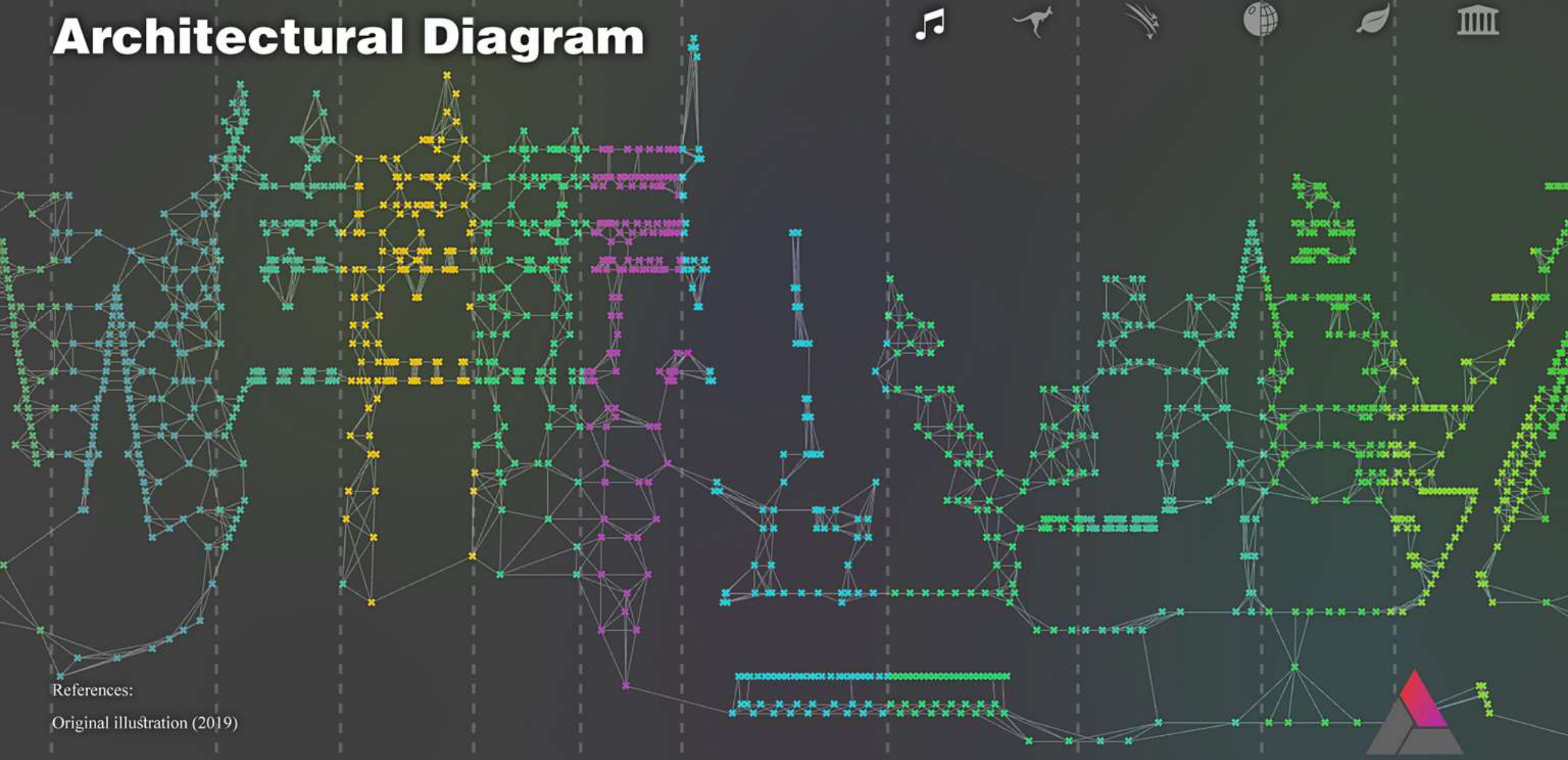
Original illustration (2019)

Architectural Diagram

References:

Original illustration (2019)

Architectural Diagram

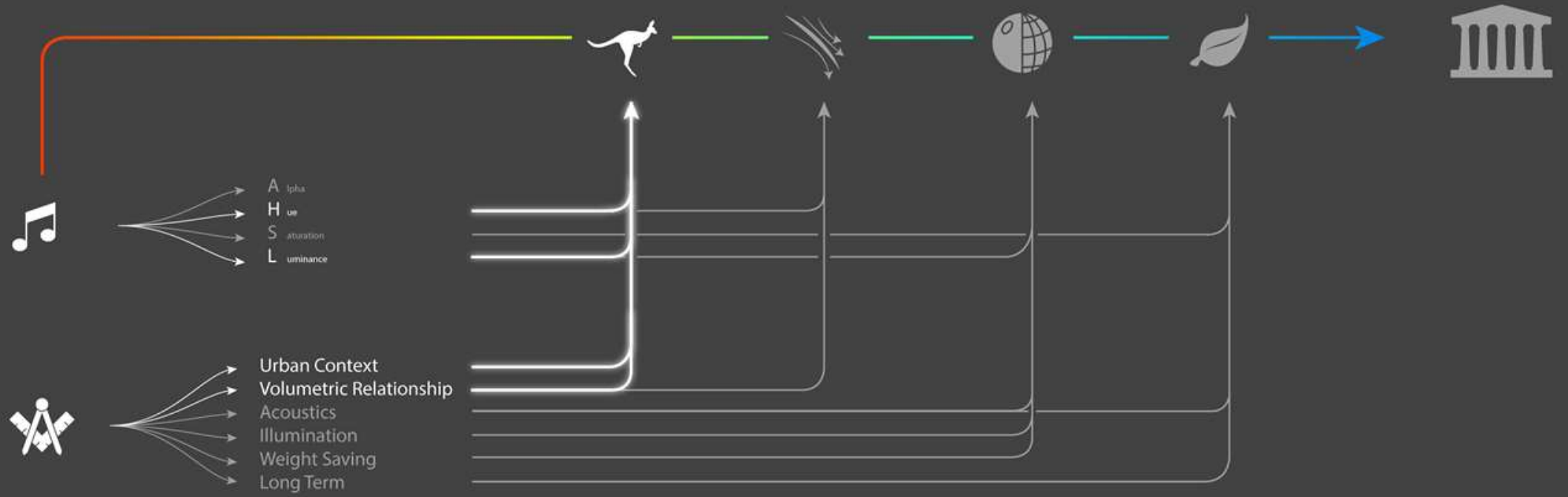


References:

Original illustration (2019)

Data Flow and Strategy

Architectural Input

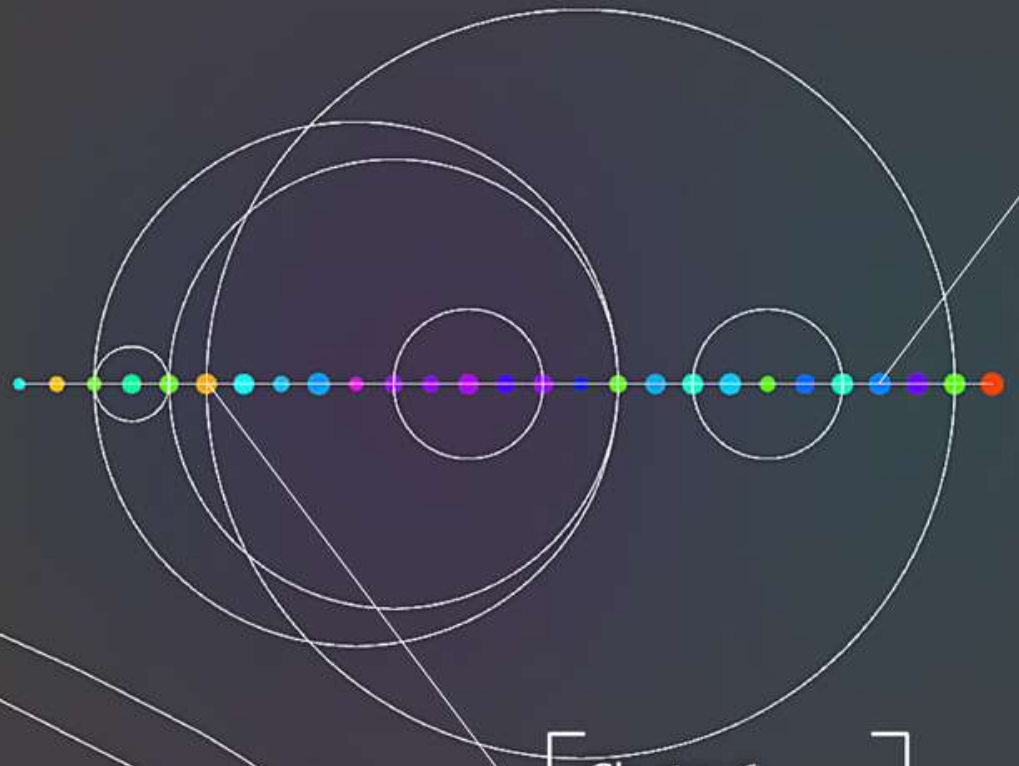


References:

Original illustration (2019)

Architectural Diagram

Circulation



Cluster 22

Length	00:32:05s
#Notes	267
Σ Velocity	15.867
Volume	68m³

Cluster 6

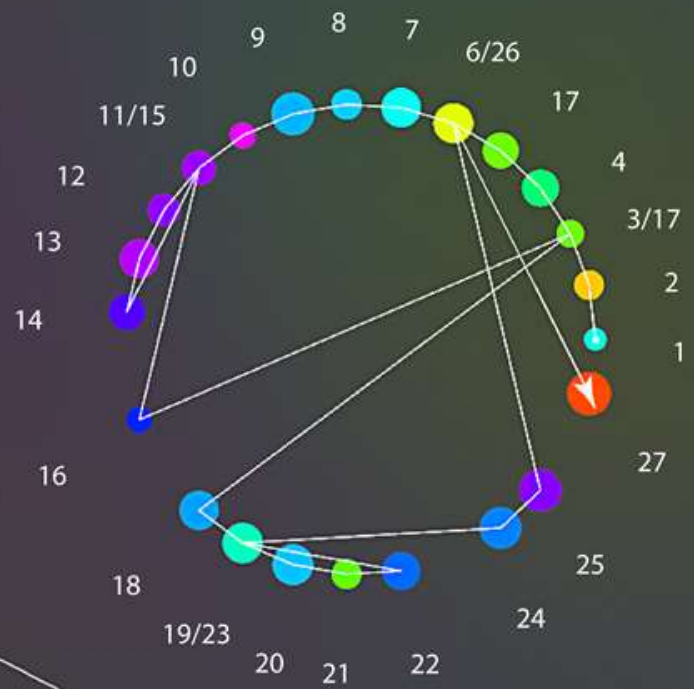
Length	00:48:27s
#Notes	369
Σ Velocity	22.346
Volume	82m³

References:

Original il[illegible]

Architectural Diagram

Circulation



Clusters

Playtime	13:57
No. Clusters	27
No. Duplicate	4
Time/Cluster	ca. 30 seconds

References:

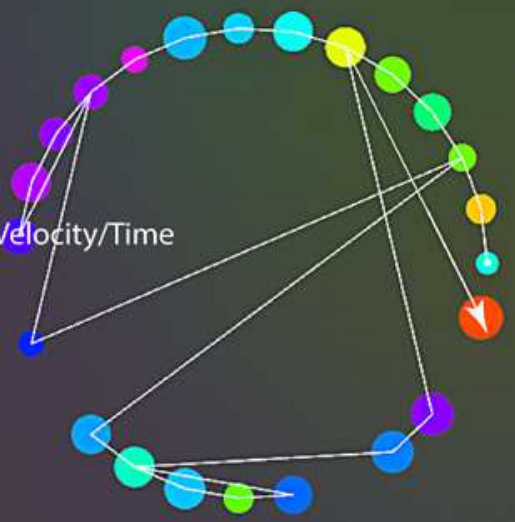
Original il[illegible]

Architectural Diagram

Circulation - *Kangaroo Phyics*

Rules:

Find Entrance/Exit	Manually Chosen
Relative Length	Relative to accumulated Velocity/Time
Reduce Kinks	Equal line Segements
Keep Within Bounds	Equally distributed
Gravity	Equally distributed



References:

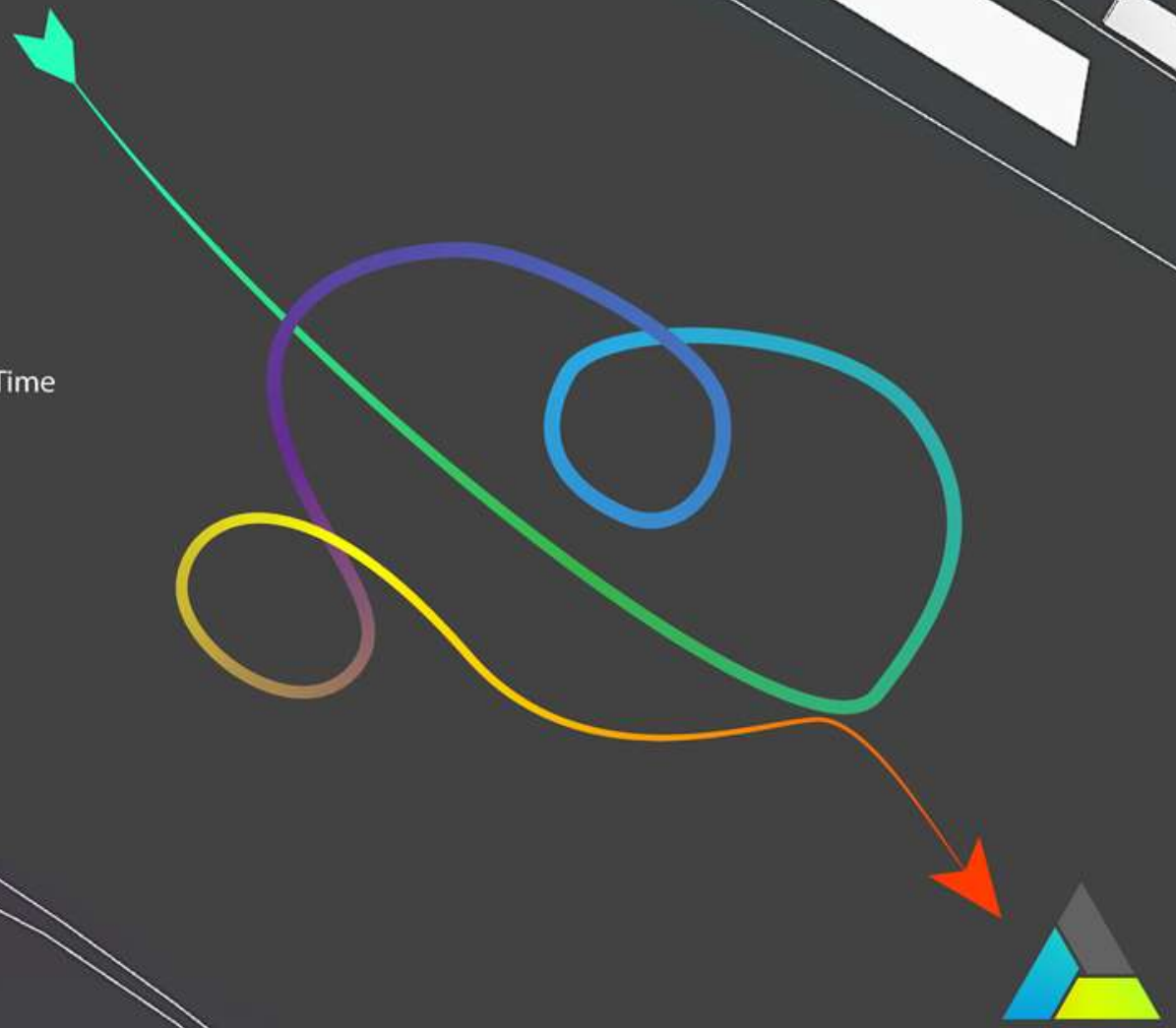
Original illustration (2019)

Architectural Diagram

Circulation - *Kangaroo Phyics*

Rules:

Find Entrance/Exit	Manually Chosen
Relative Length	Relative to accumulated Velocity/Time
Reduce Kinks	Equal line Segements
Keep Within Bounds	Equally distributed
Gravity	Equally distributed

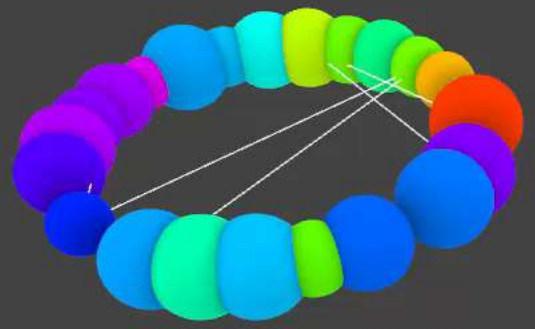


References:

Original illustration (2019)

Architectural Diagram

Circulation - *Kangaroo Phyics*

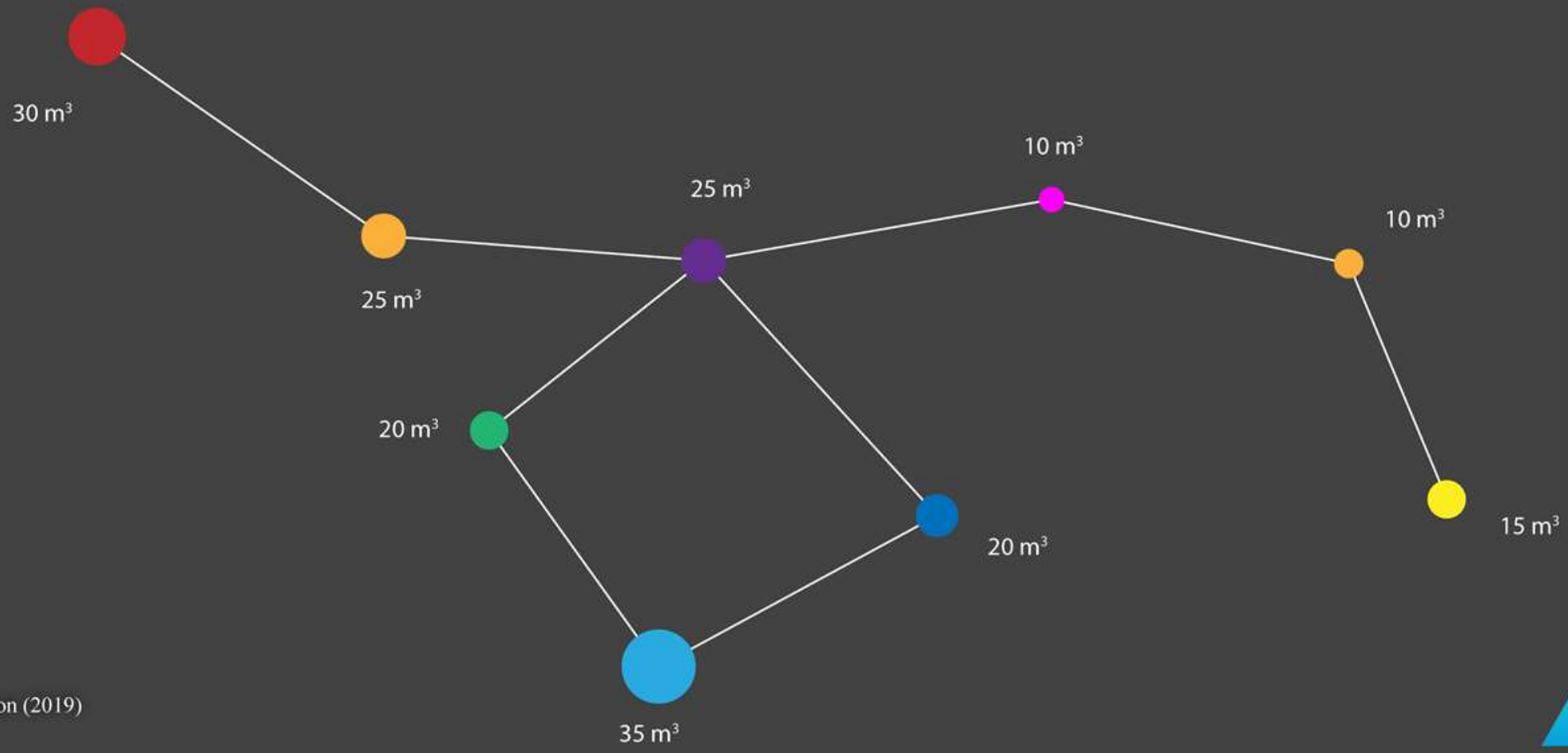


References:

Original illustration (2019)

Architectural Diagram

Volume Distribution - *Dual Graph*

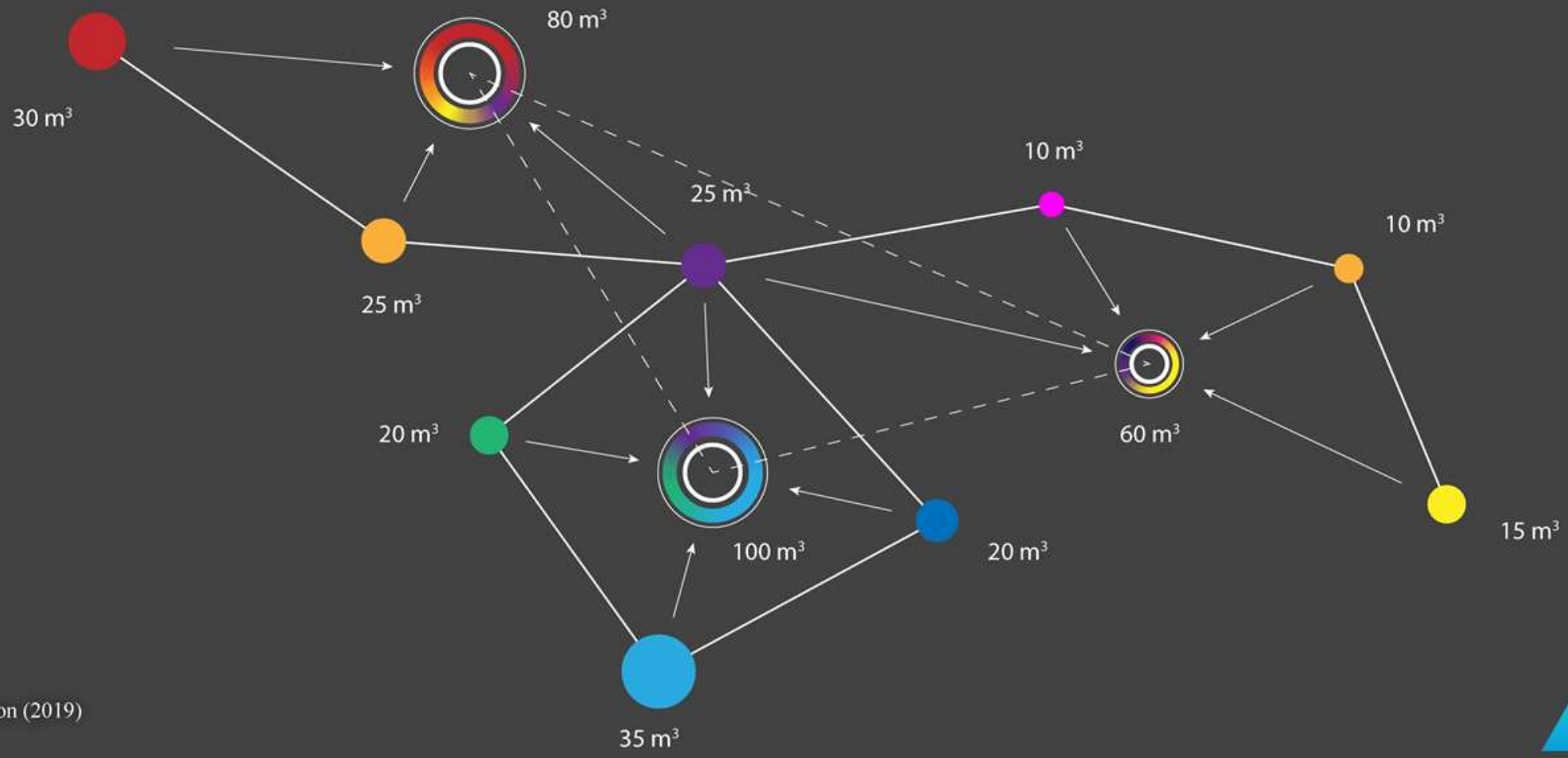


References:

Original illustration (2019)

Architectural Diagram

Volume Distribution - *Dual Graph*

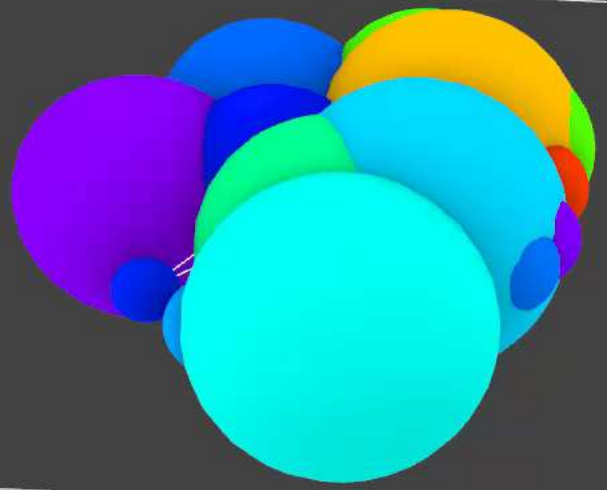


References:

Original illustration (2019)

Architectural Diagram

Volume Distribution - *Dual Graph*

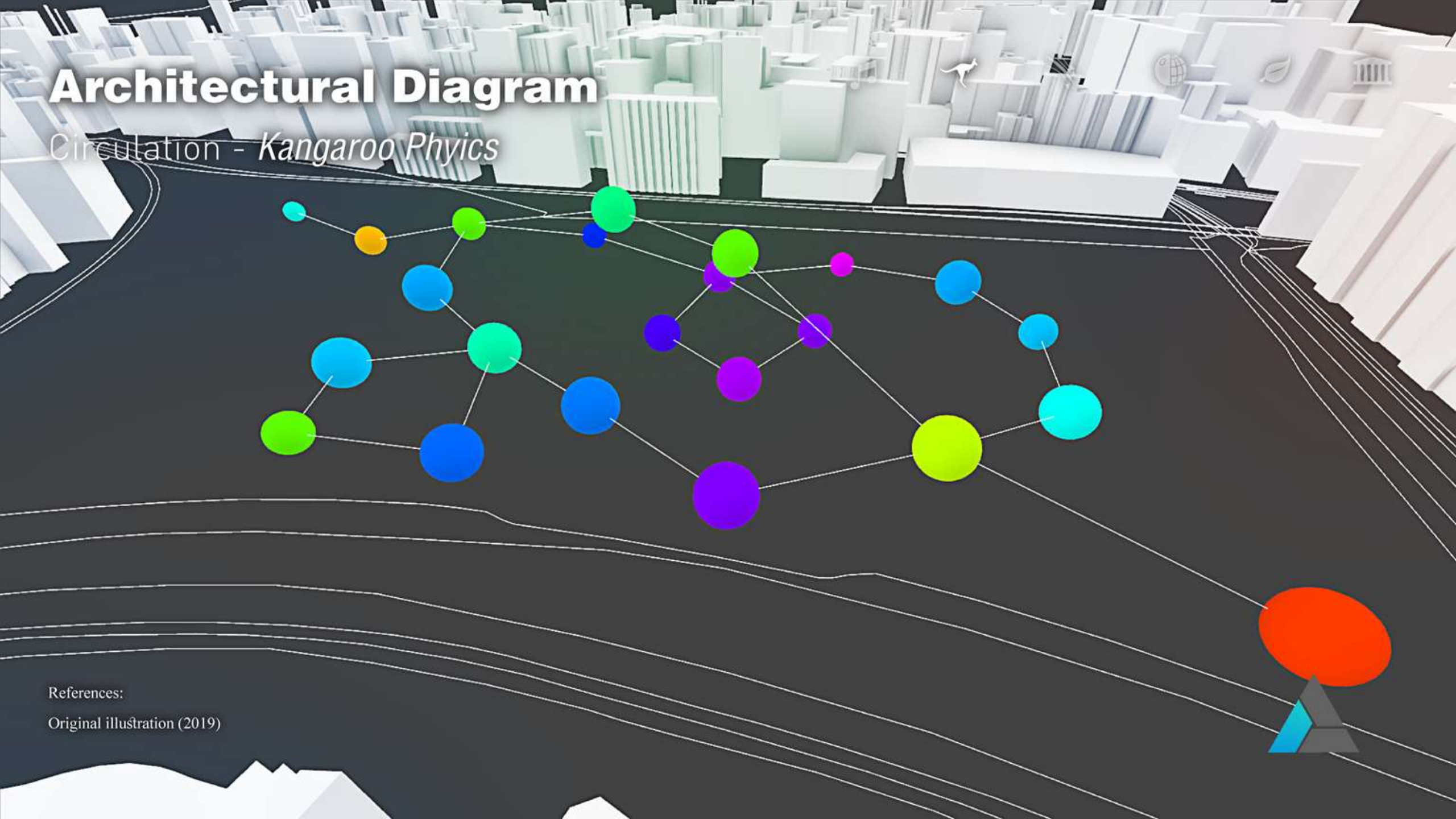


References:

Original illustration (2019)

Architectural Diagram

Circulation - *Kangaroo Phyics*

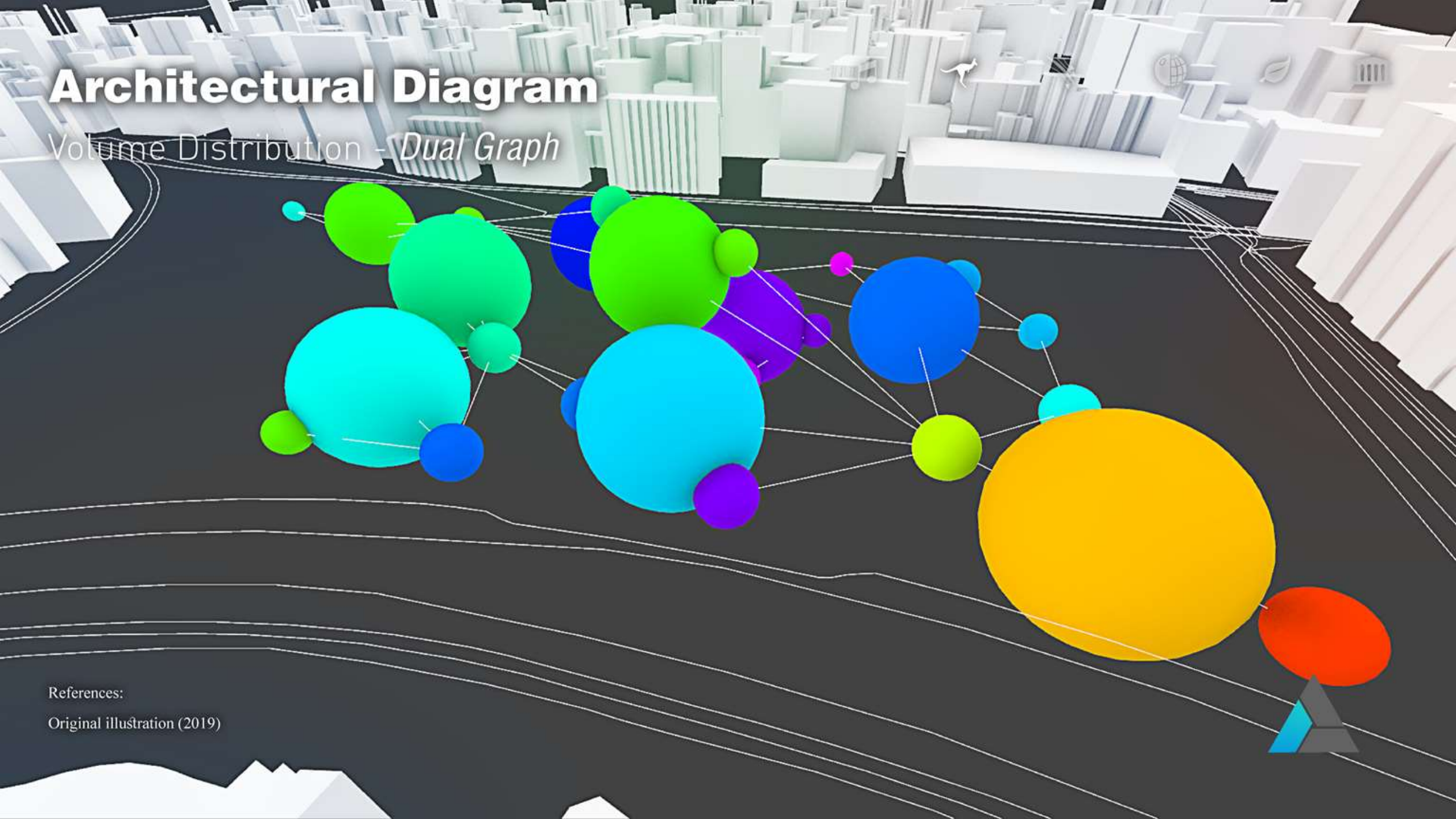


References:

Original illustration (2019)

Architectural Diagram

Volume Distribution - *Dual Graph*

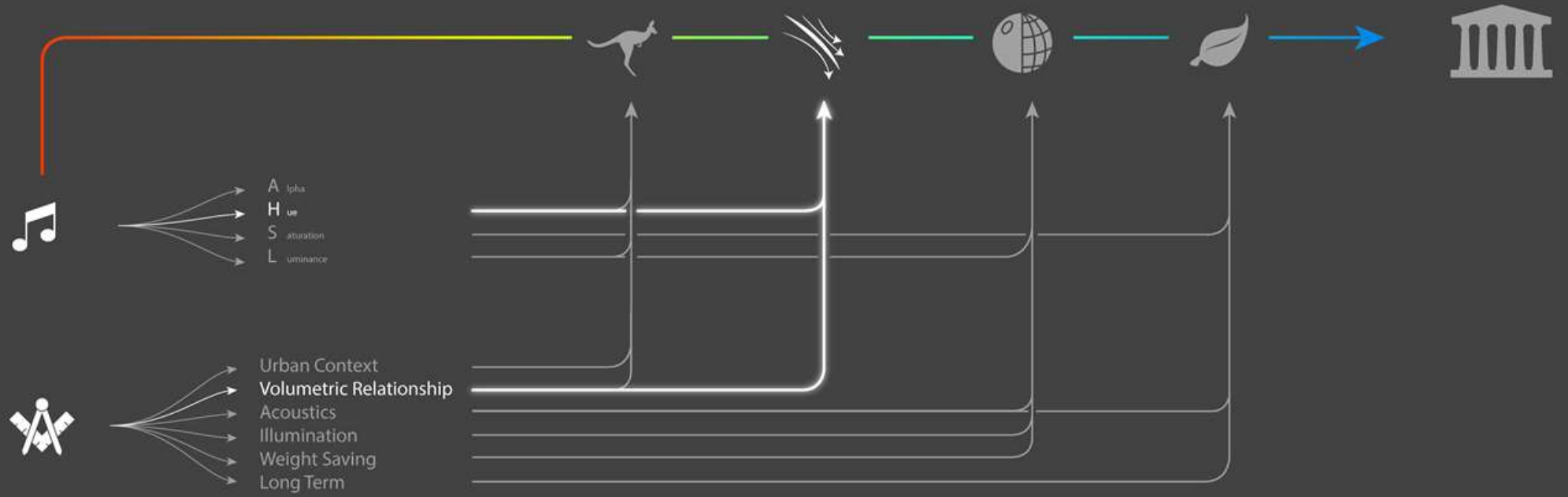


References:

Original illustration (2019)

Data Flow and Strategy

Architectural Input



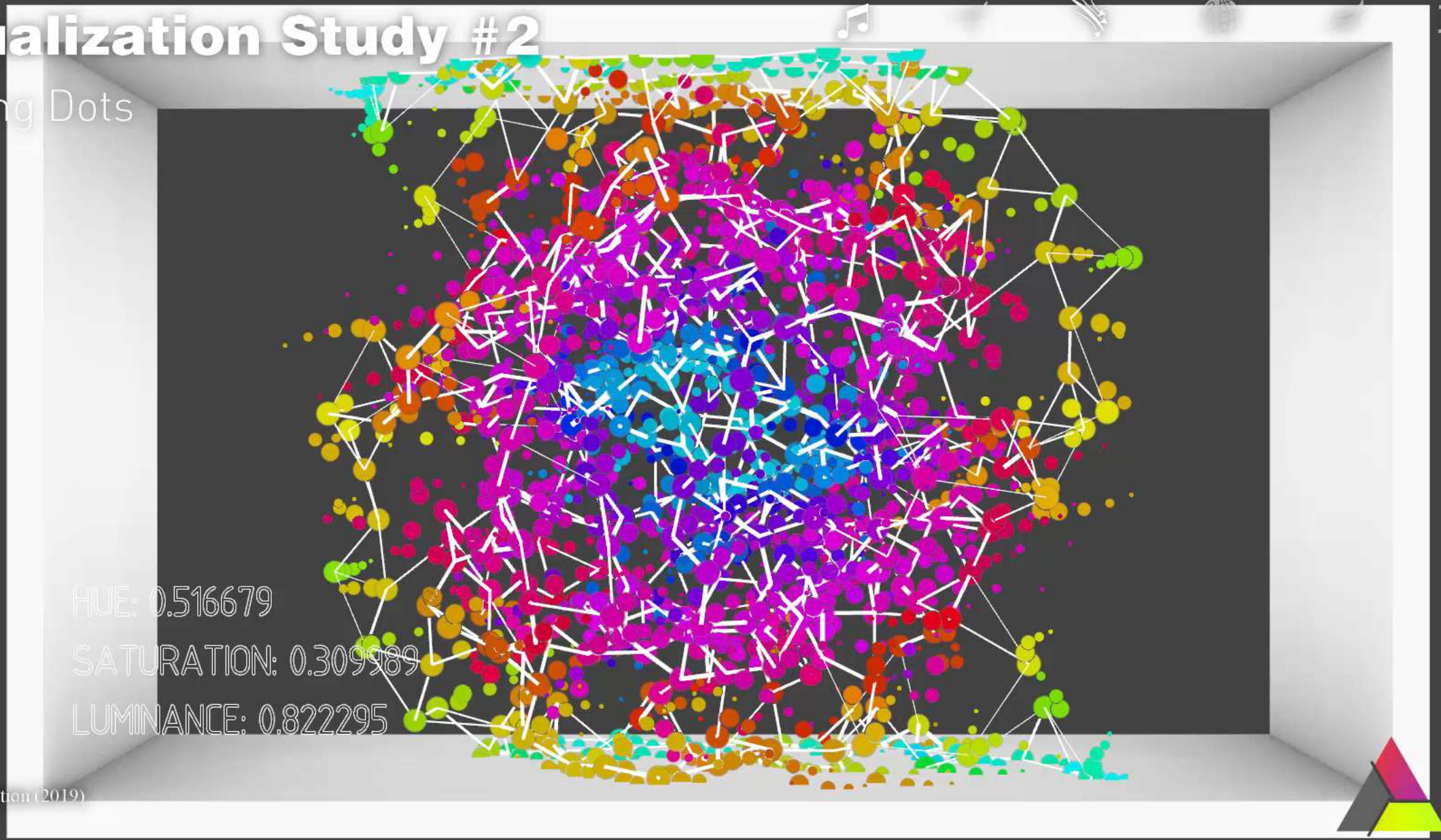
References:

Original illustration (2019)

Visualization Study #2

Dancing Dots

A lpha
H ue
S aturation
L uminance



References:

Original illustration (2019)

Vector Fields

Rules:

#1 Follow Circulation Diagram

#2 Avoid Potential Volume

#3 Establish Relationship Volume Distribution

References:

Original illustration (2019)

Vector Fields

#1

Linear Force

Follow Circulation Diagram

#2

Magnetic Force

Avoid Potential Volume

#3

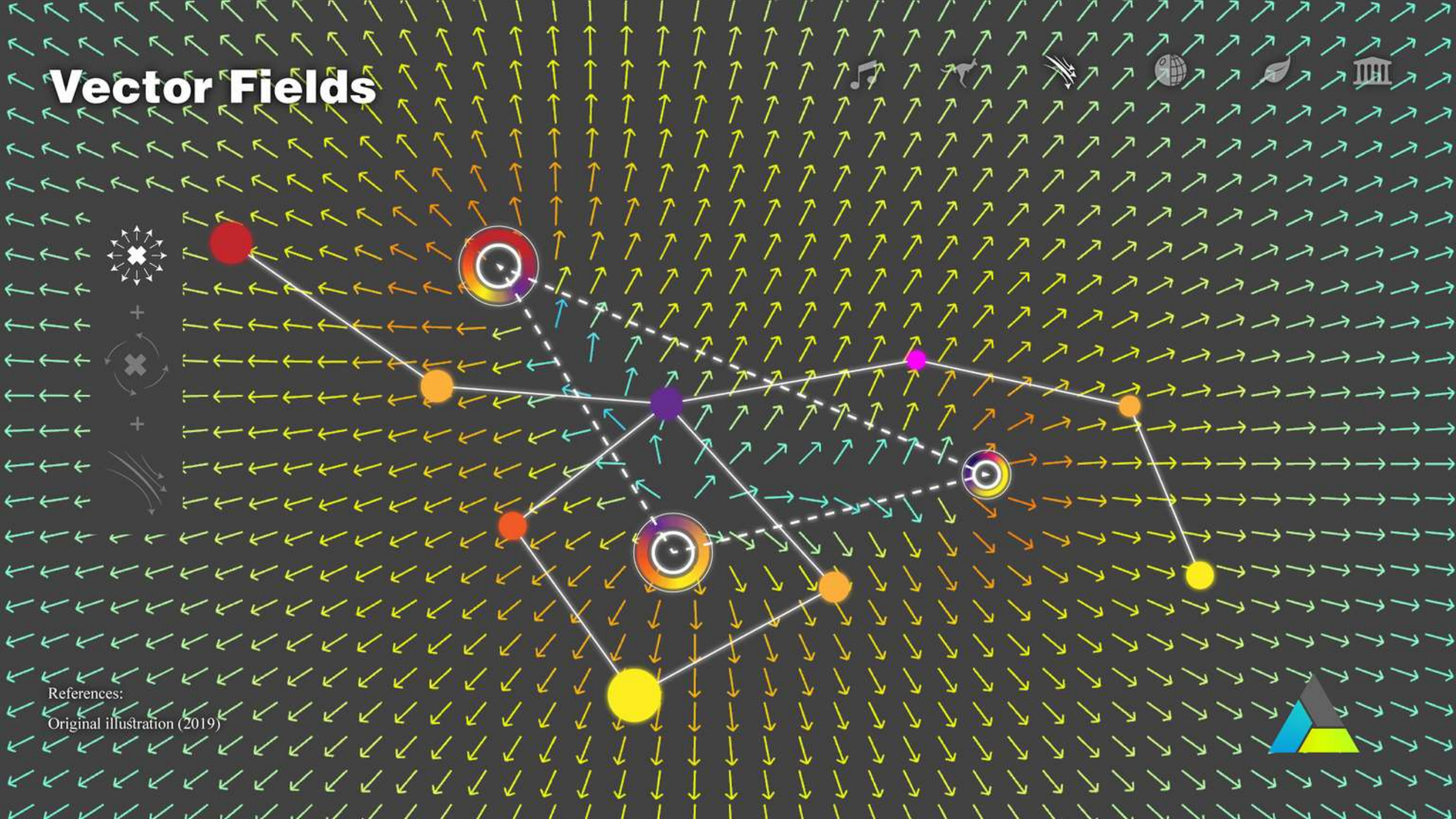
Rotational Force

Establish Relationship Volume Distribution

References:

Original illustration (2019)

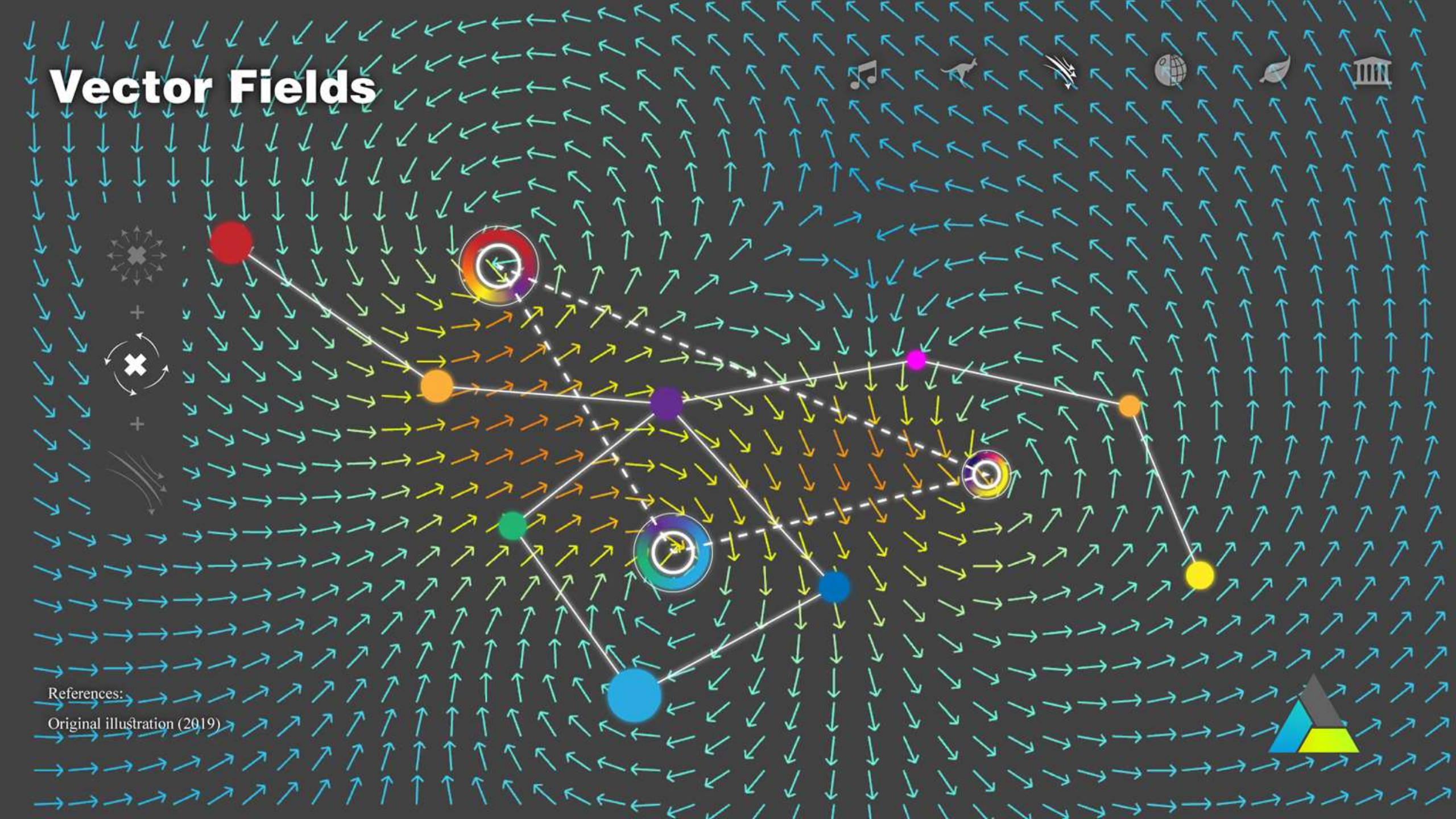
Vector Fields



References:

Original illustration (2019)

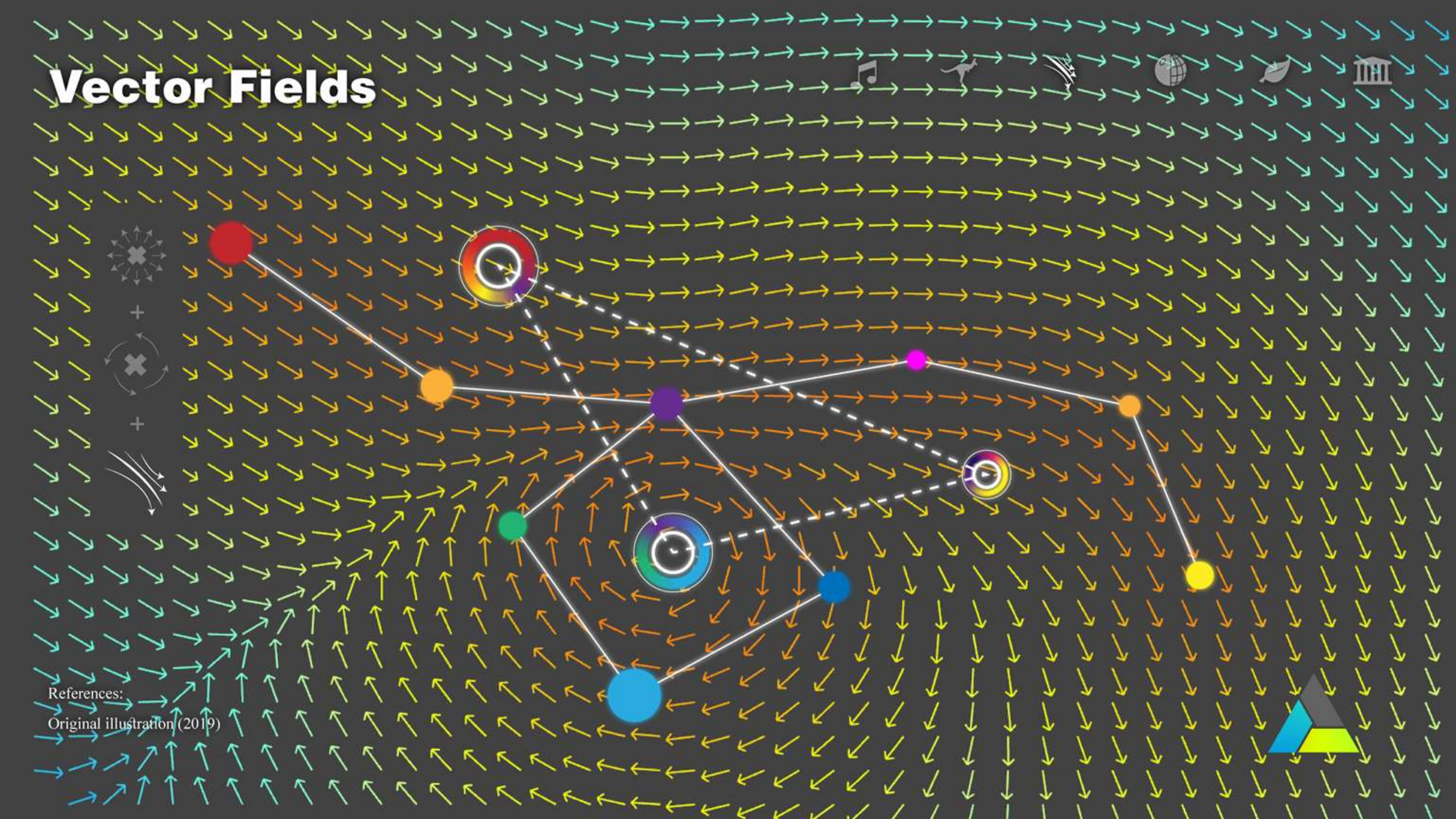
Vector Fields



References:

Original illustration (2019)

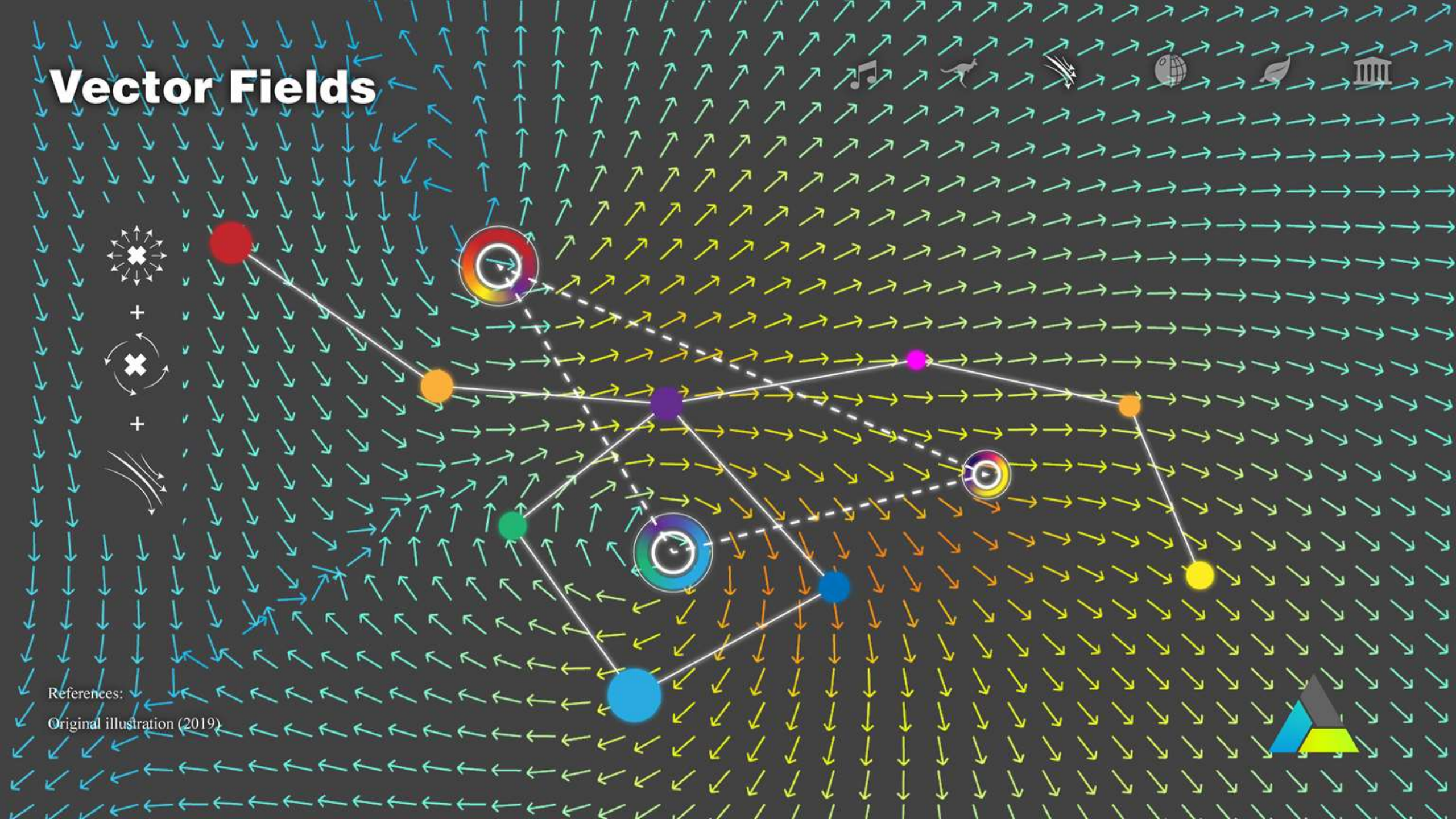
Vector Fields



References:

Original illustration (2019)

Vector Fields

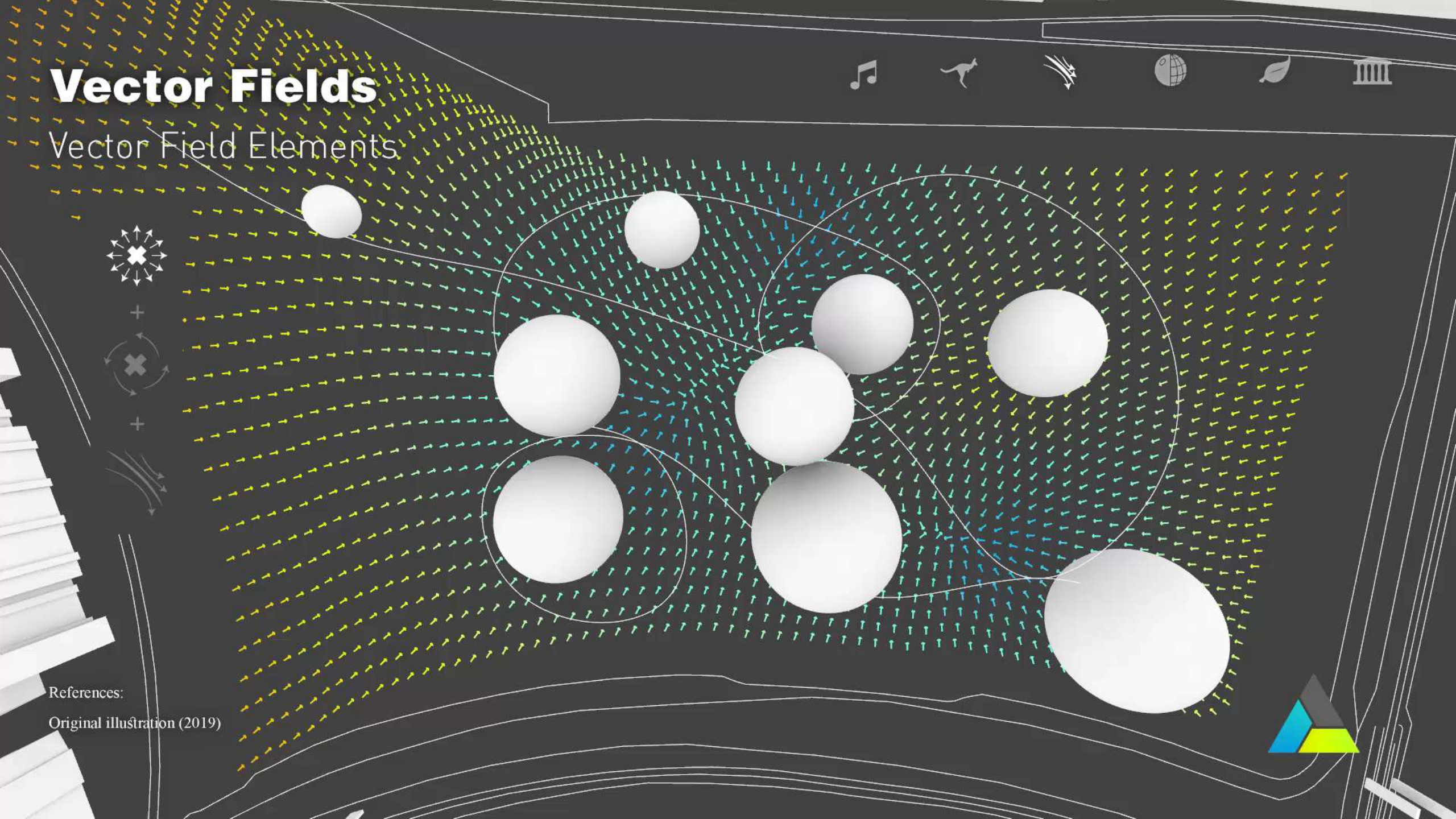


References:

Original illustration (2019)

Vector Fields

Vector Field Elements

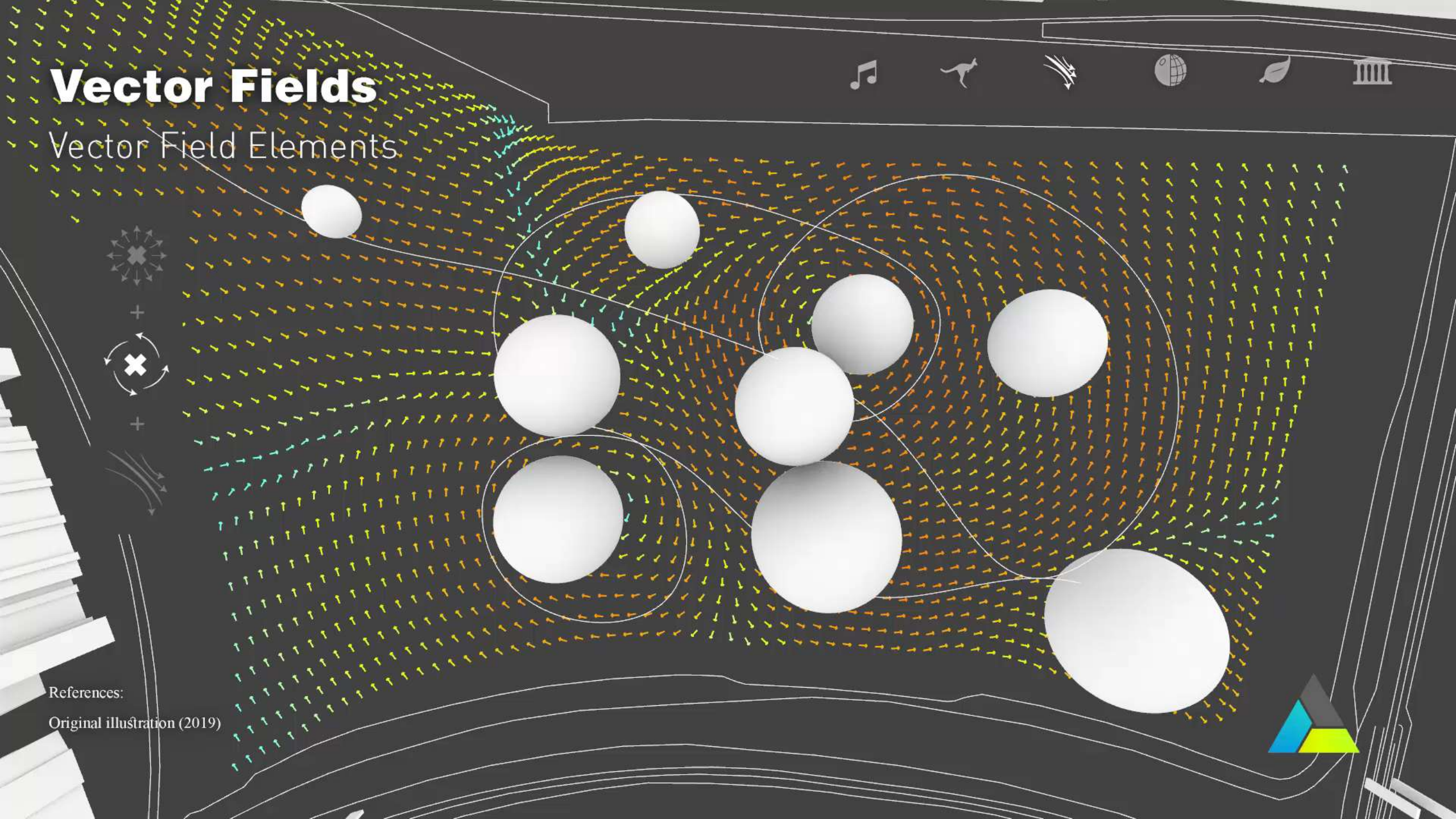


References:

Original illustration (2019)

Vector Fields

Vector Field Elements

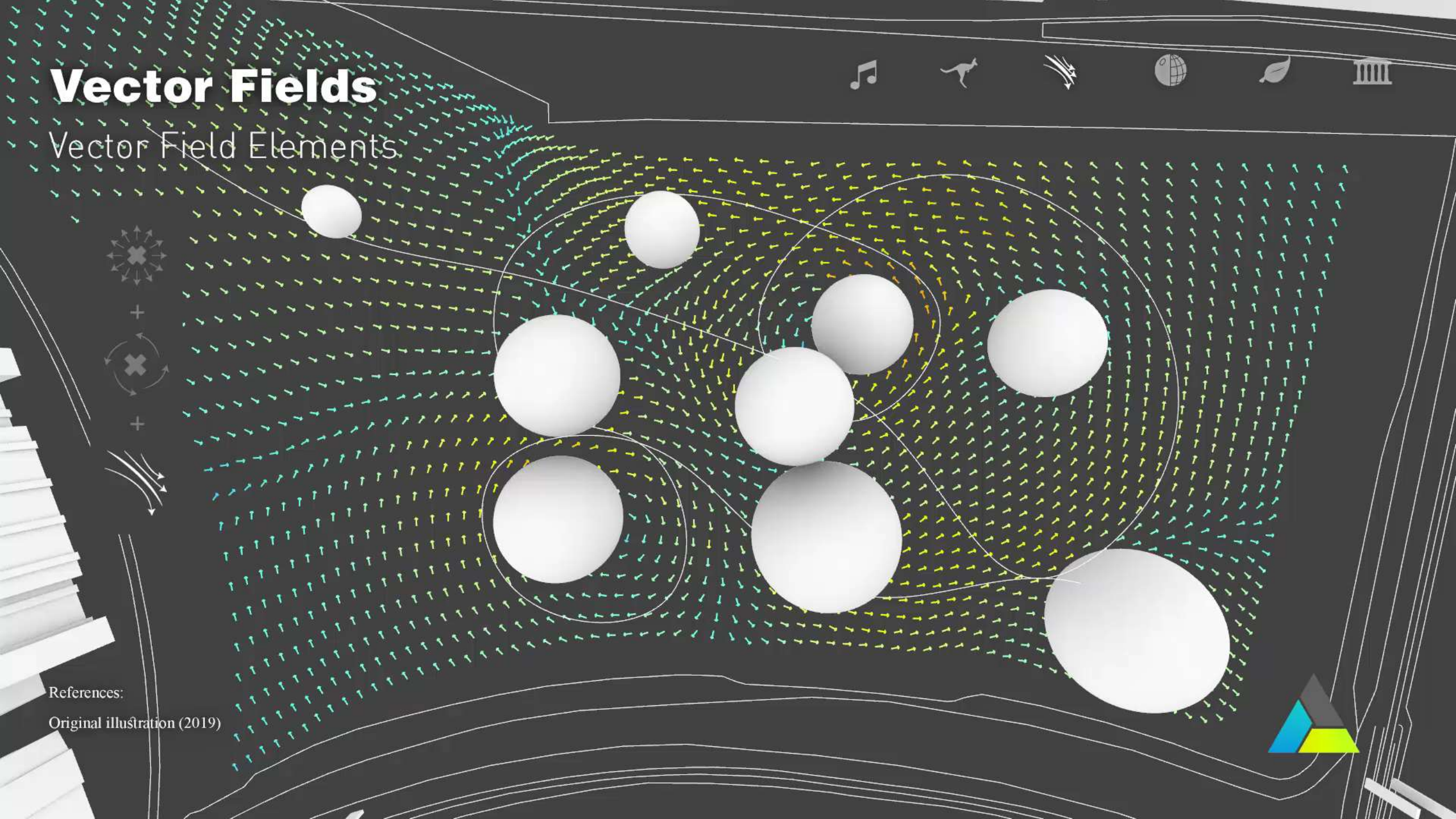


References:

Original illustration (2019)

Vector Fields

Vector Field Elements

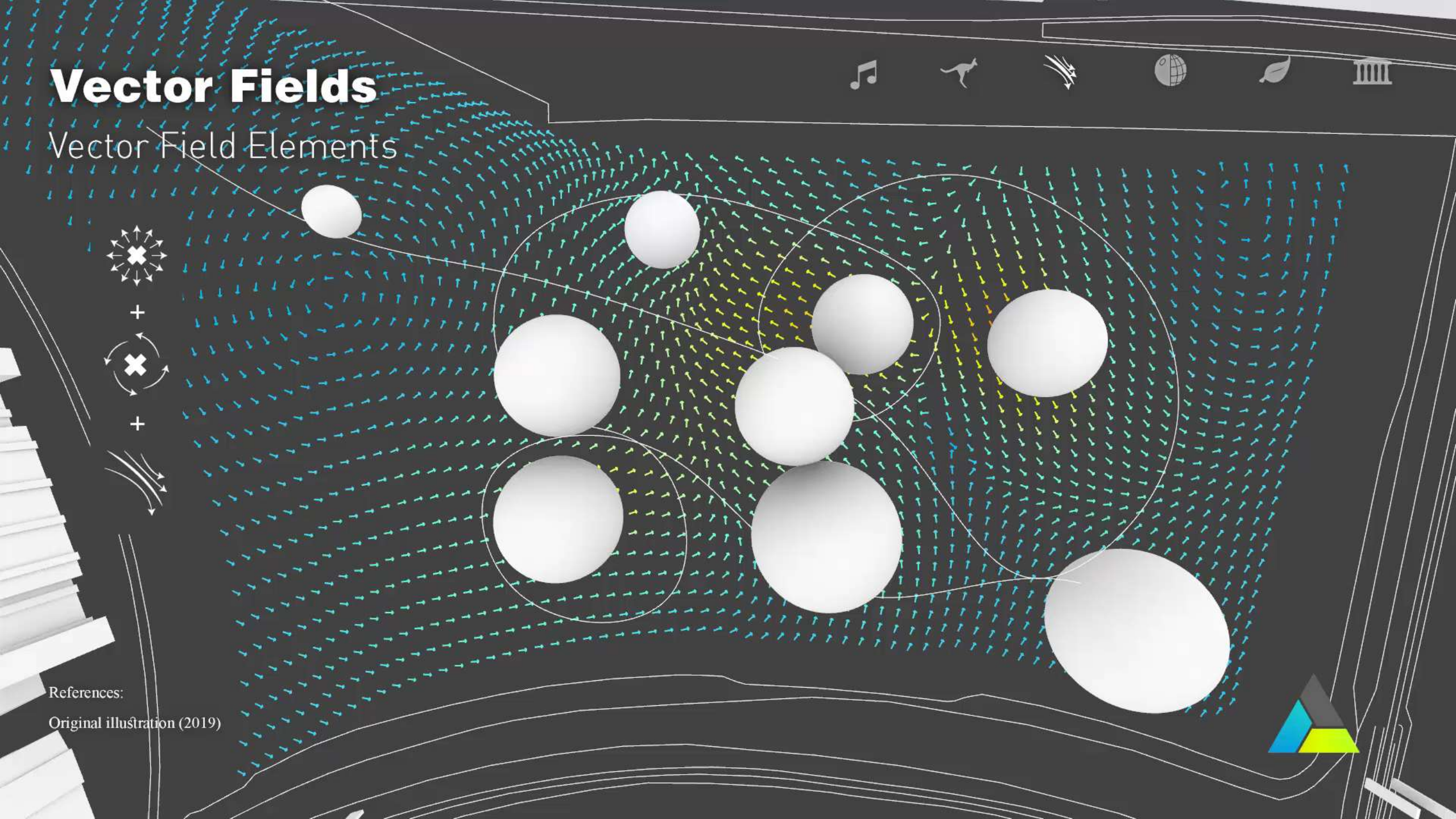


References:

Original illustration (2019)

Vector Fields

Vector Field Elements

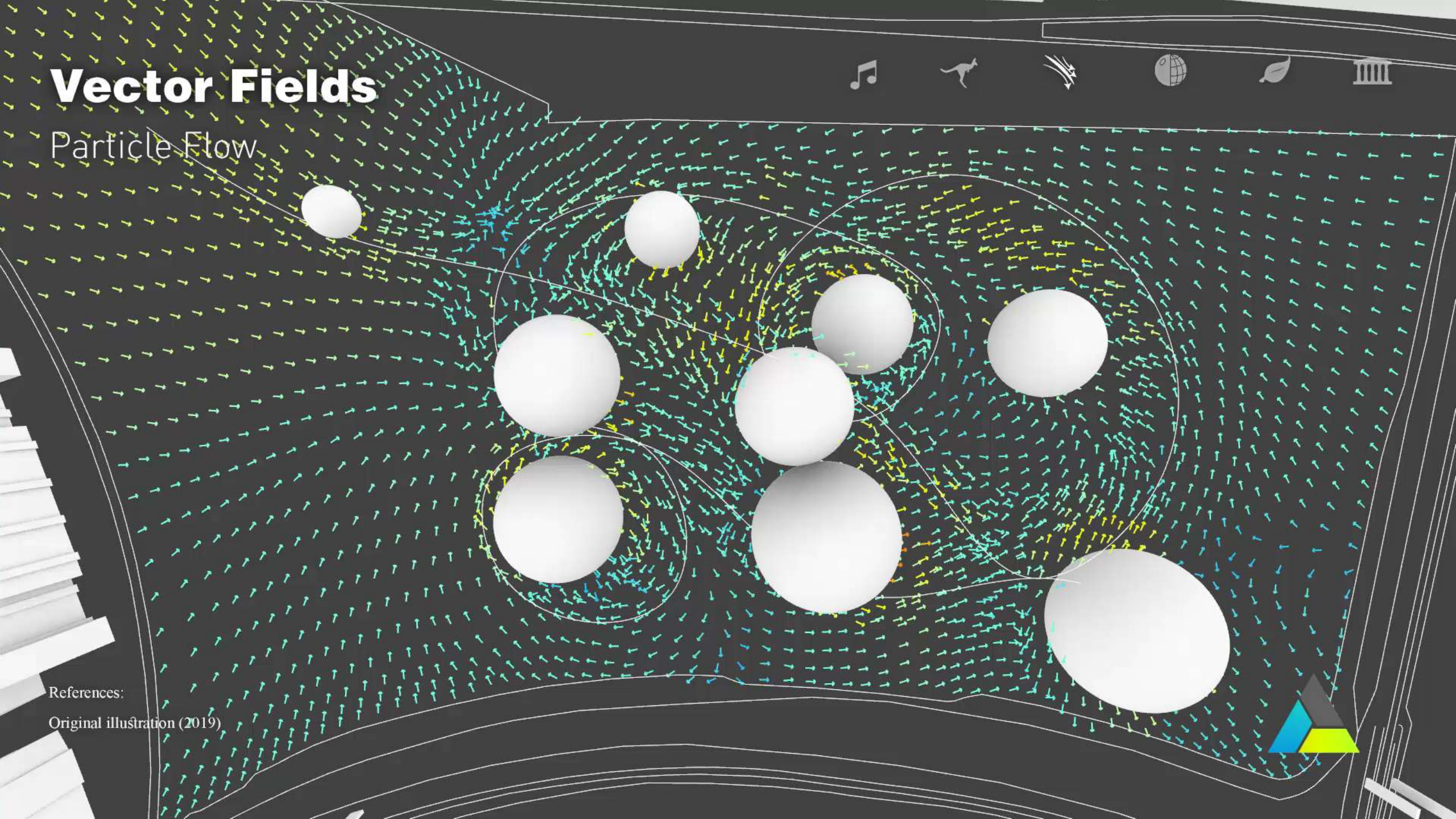


References:

Original illustration (2019)

Vector Fields

Particle Flow

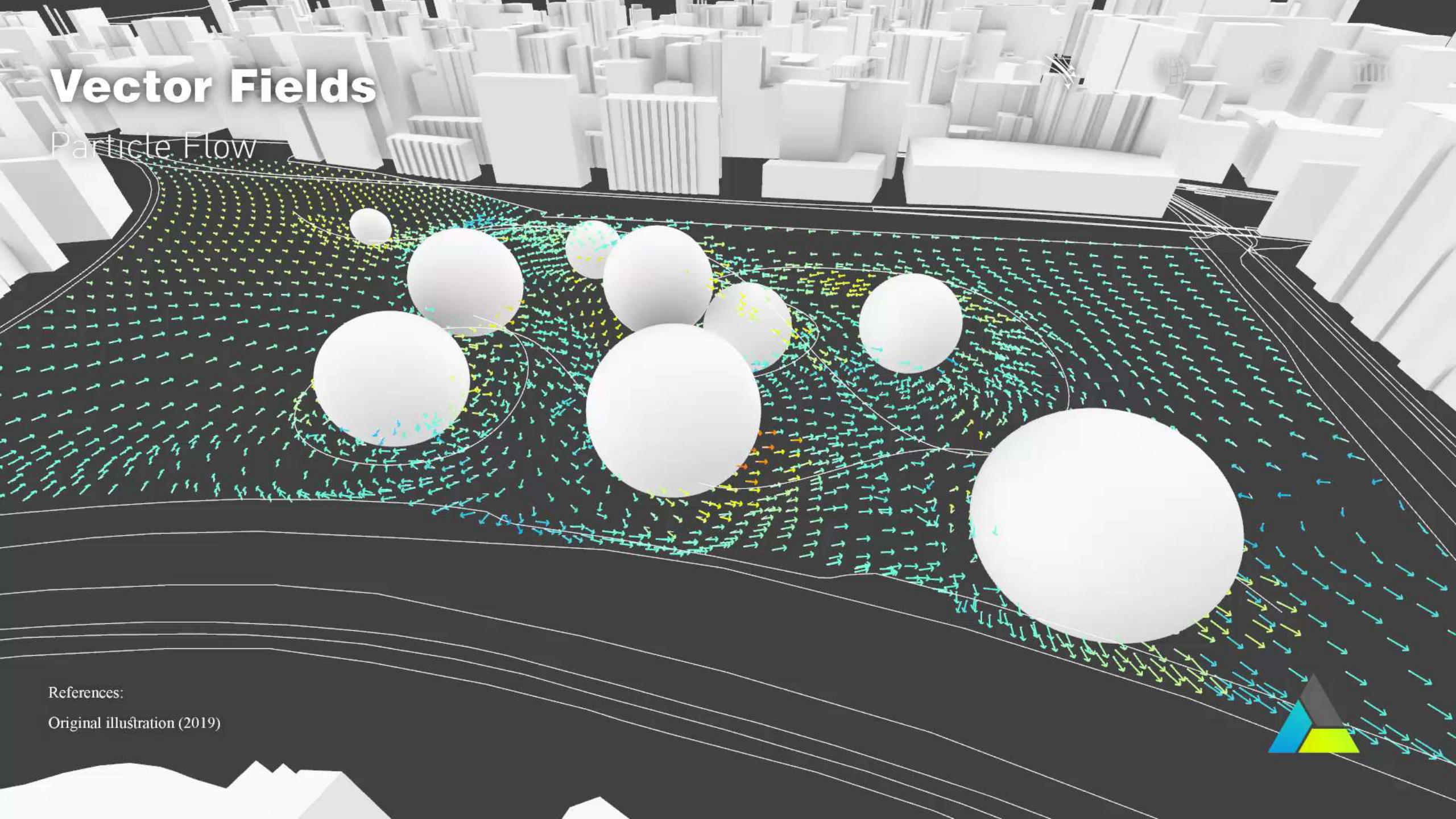


References:

Original illustration (2019)

Vector Fields

Particle Flow

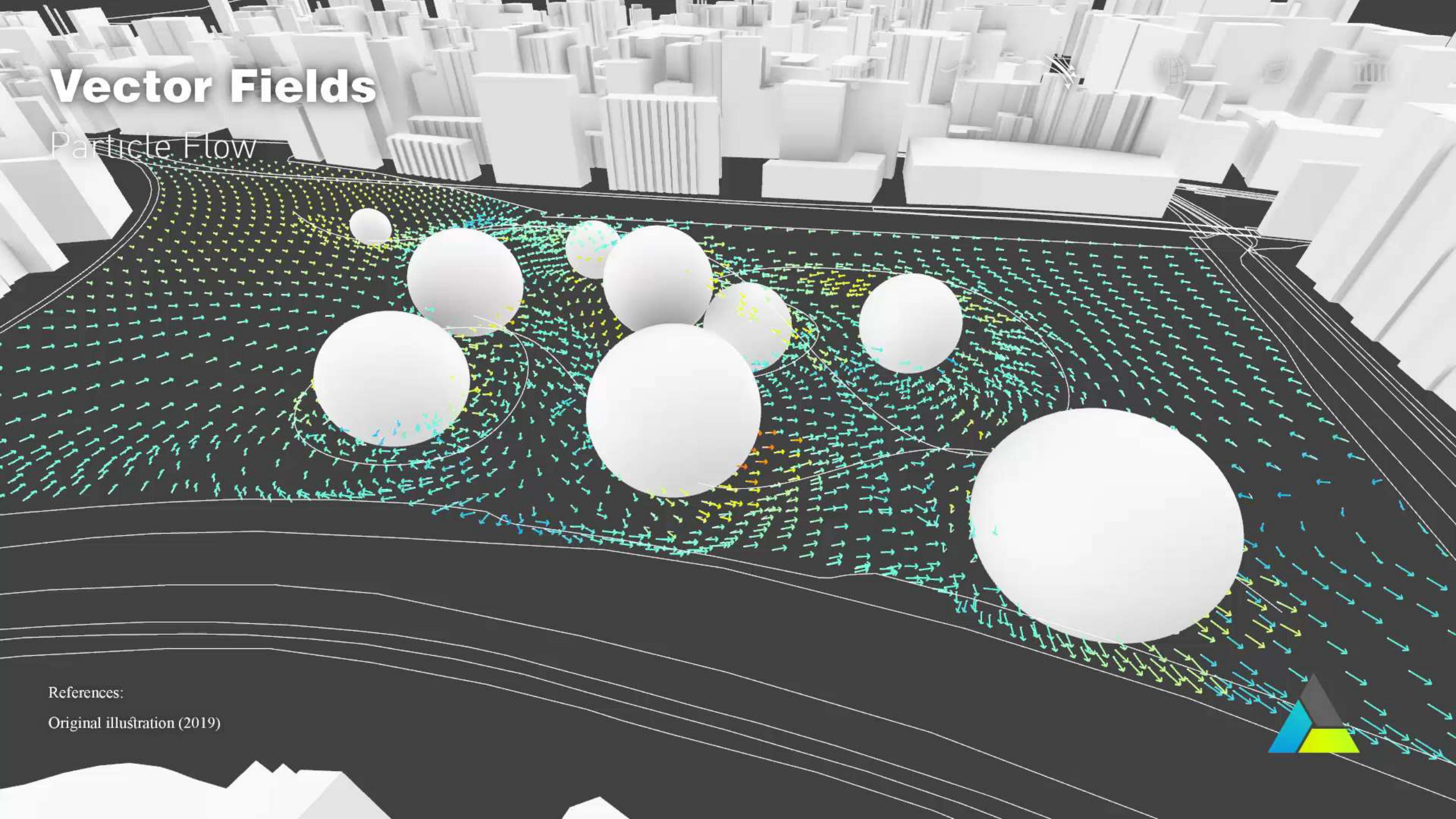


References:

Original illustration (2019)

Vector Fields

Particle Flow

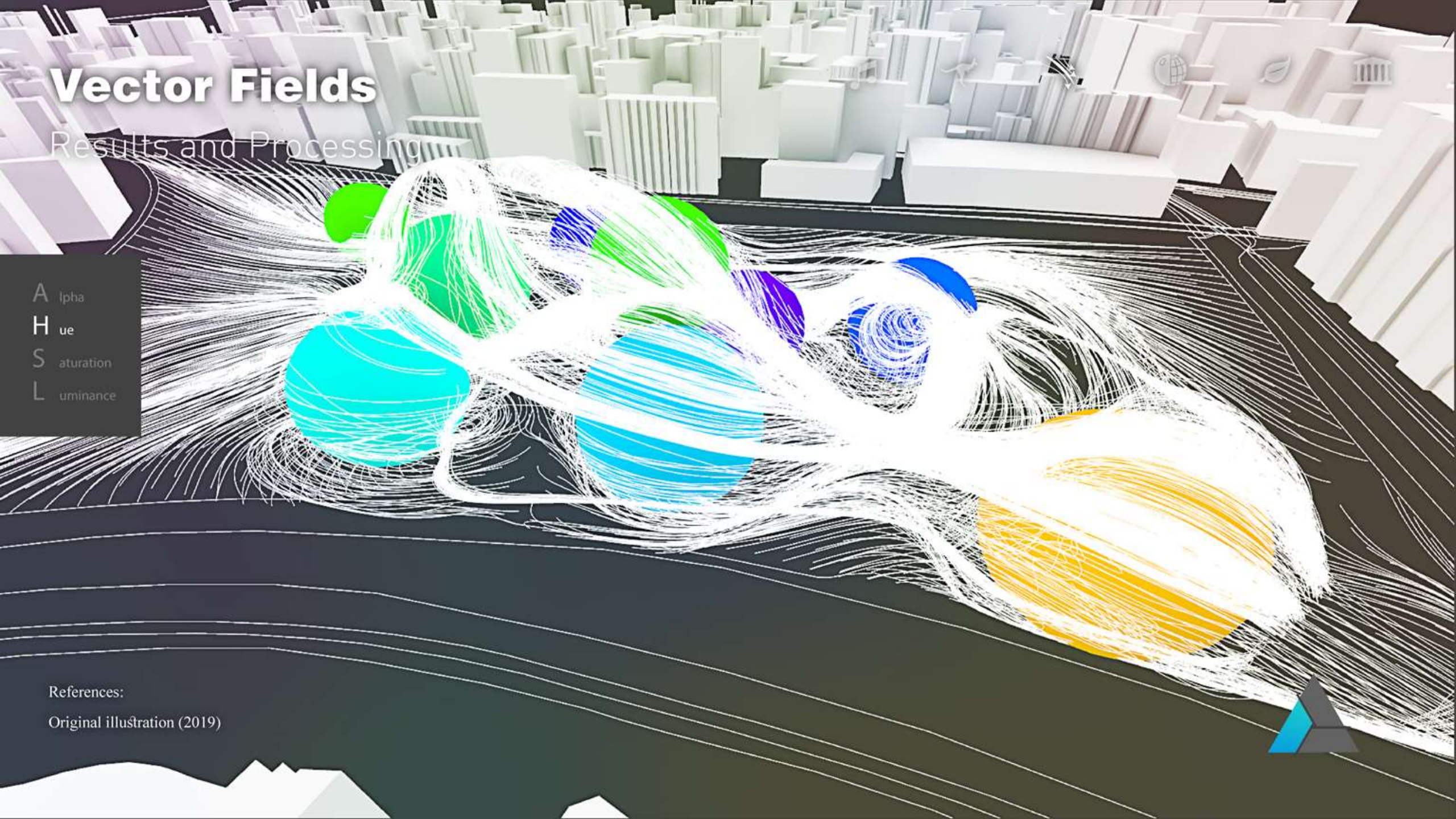


References:

Original illustration (2019)

Vector Fields

Results and Processing

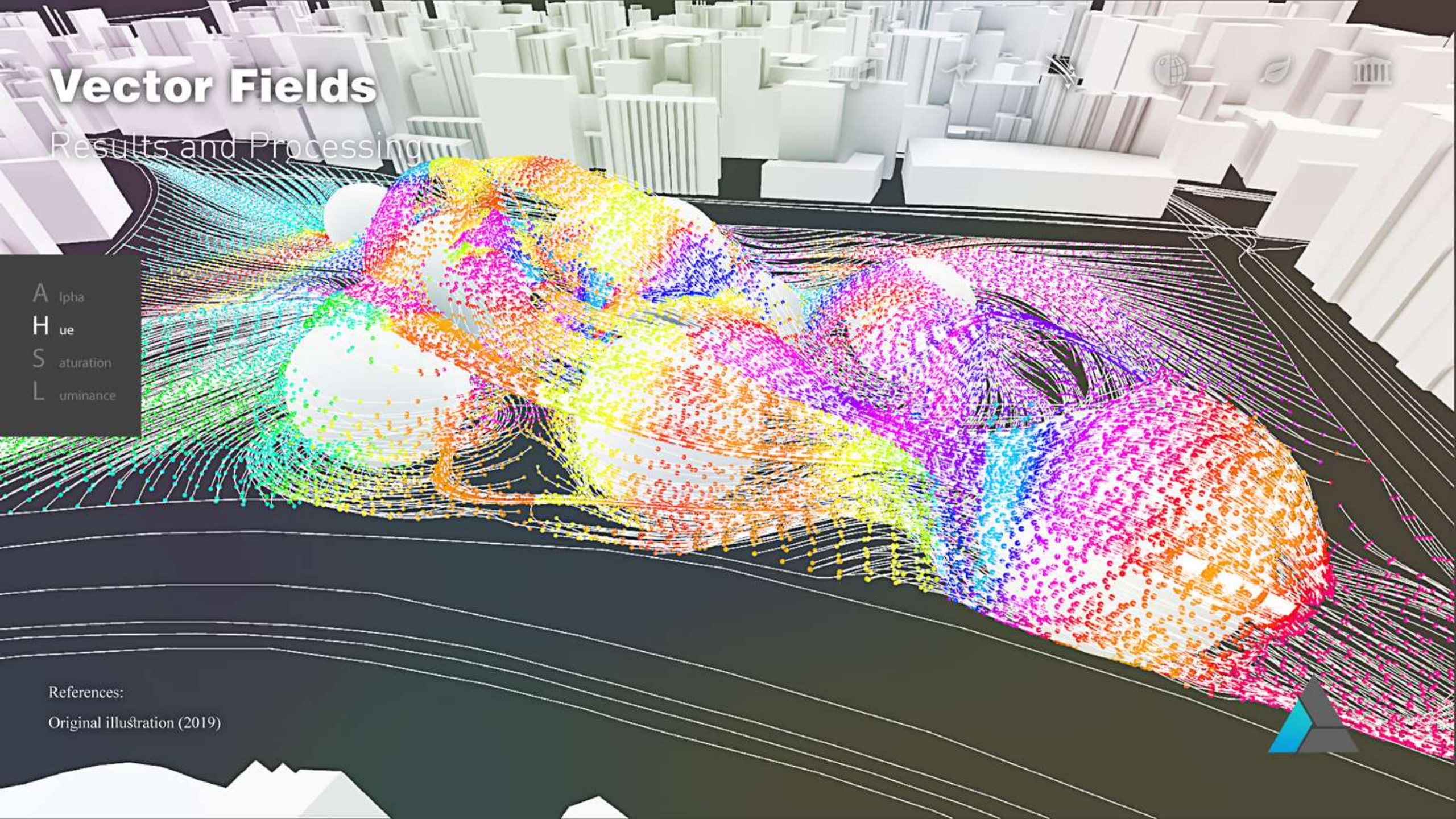


References:

Original illustration (2019)

Vector Fields

Results and Processing

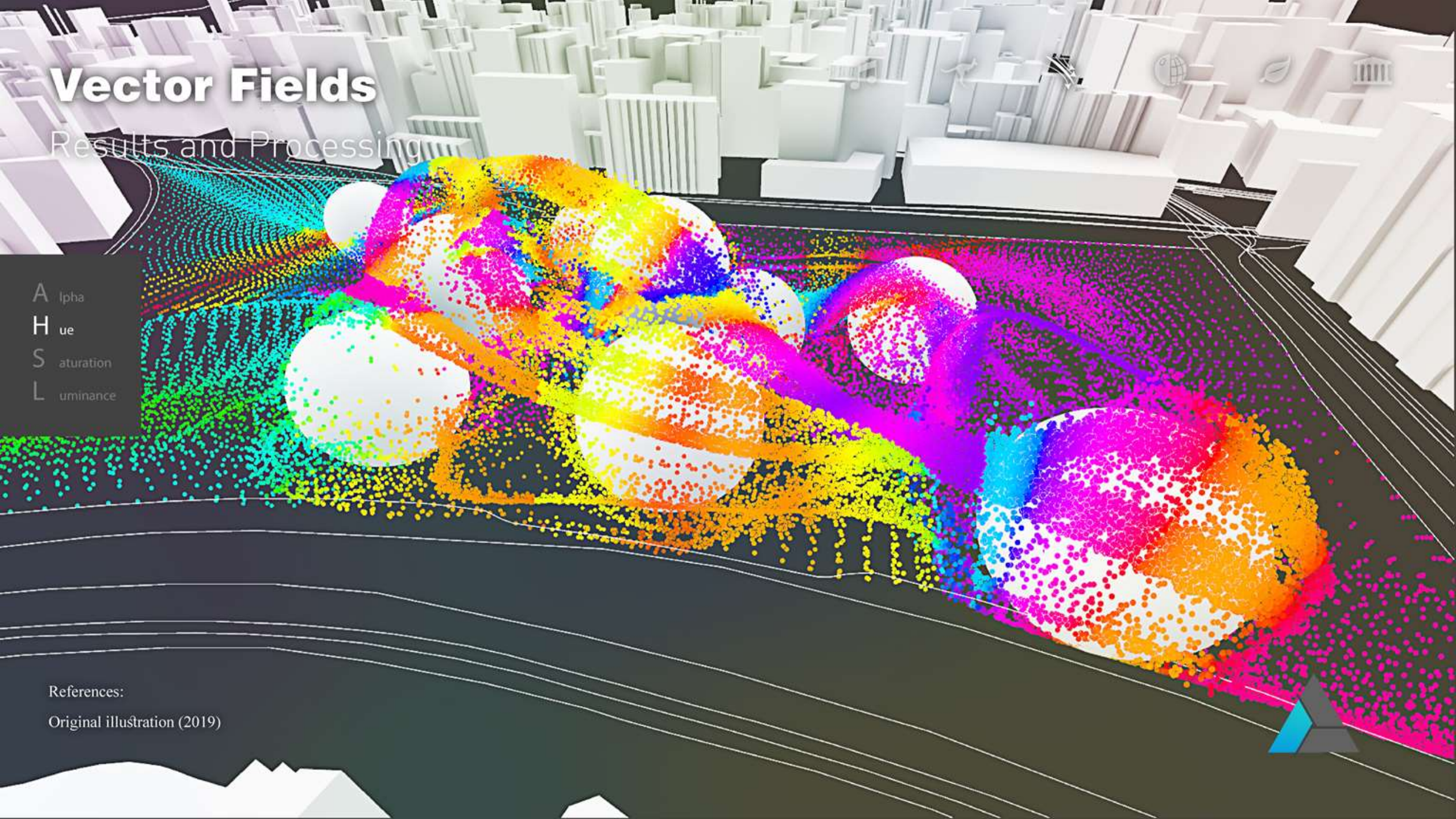


References:

Original illustration (2019)

Vector Fields

Results and Processing



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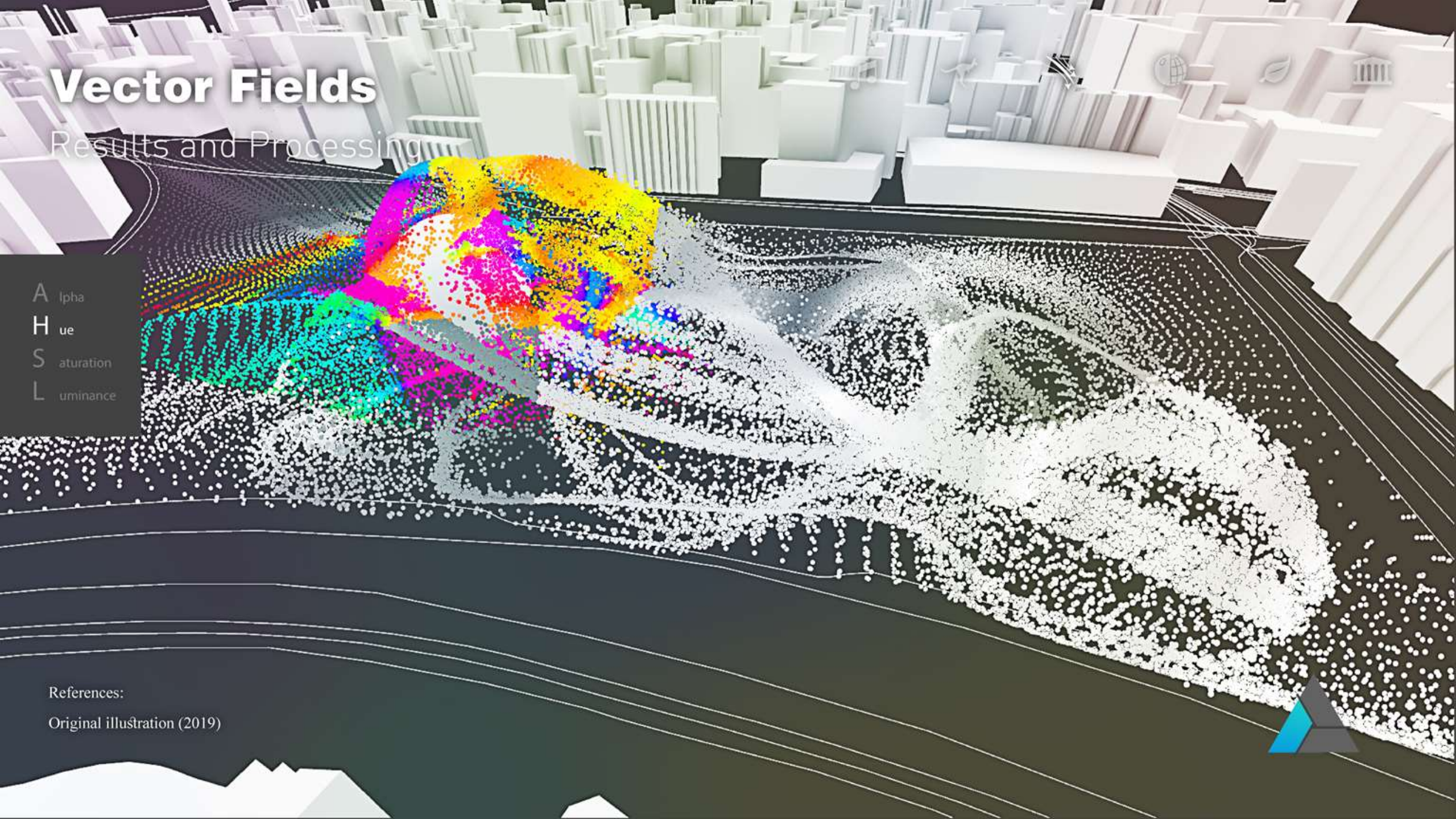
Original illustration (2019)

Vector Fields

Results and Processing

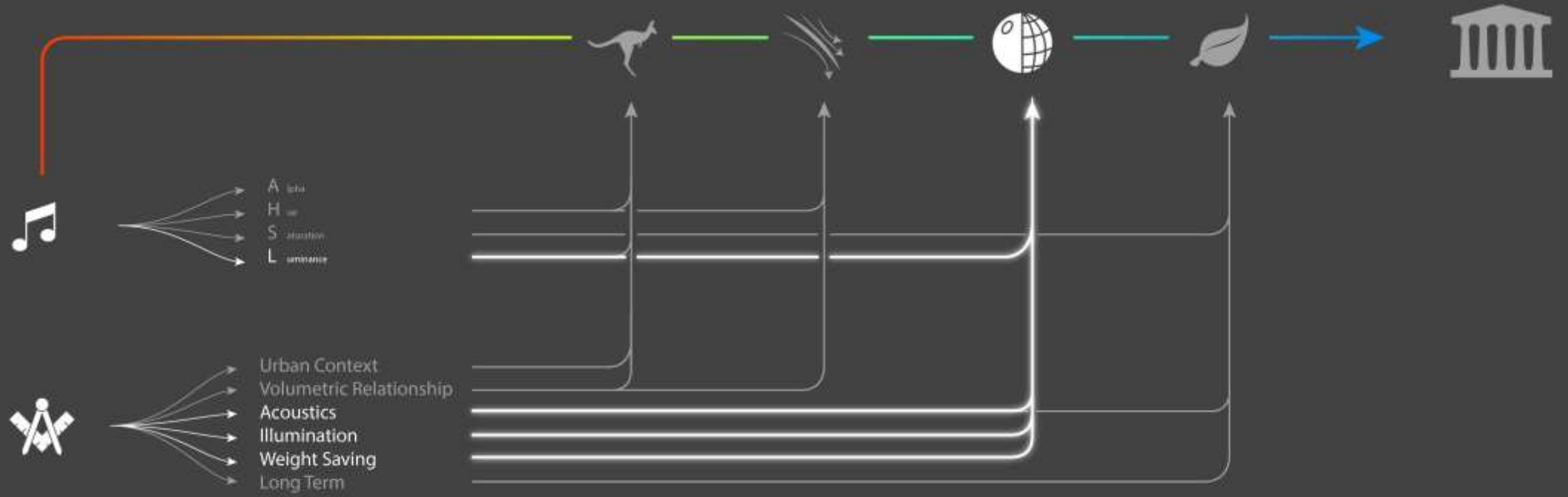


References:

Original illustration (2019)

Data Flow and Strategy

Architectural Input

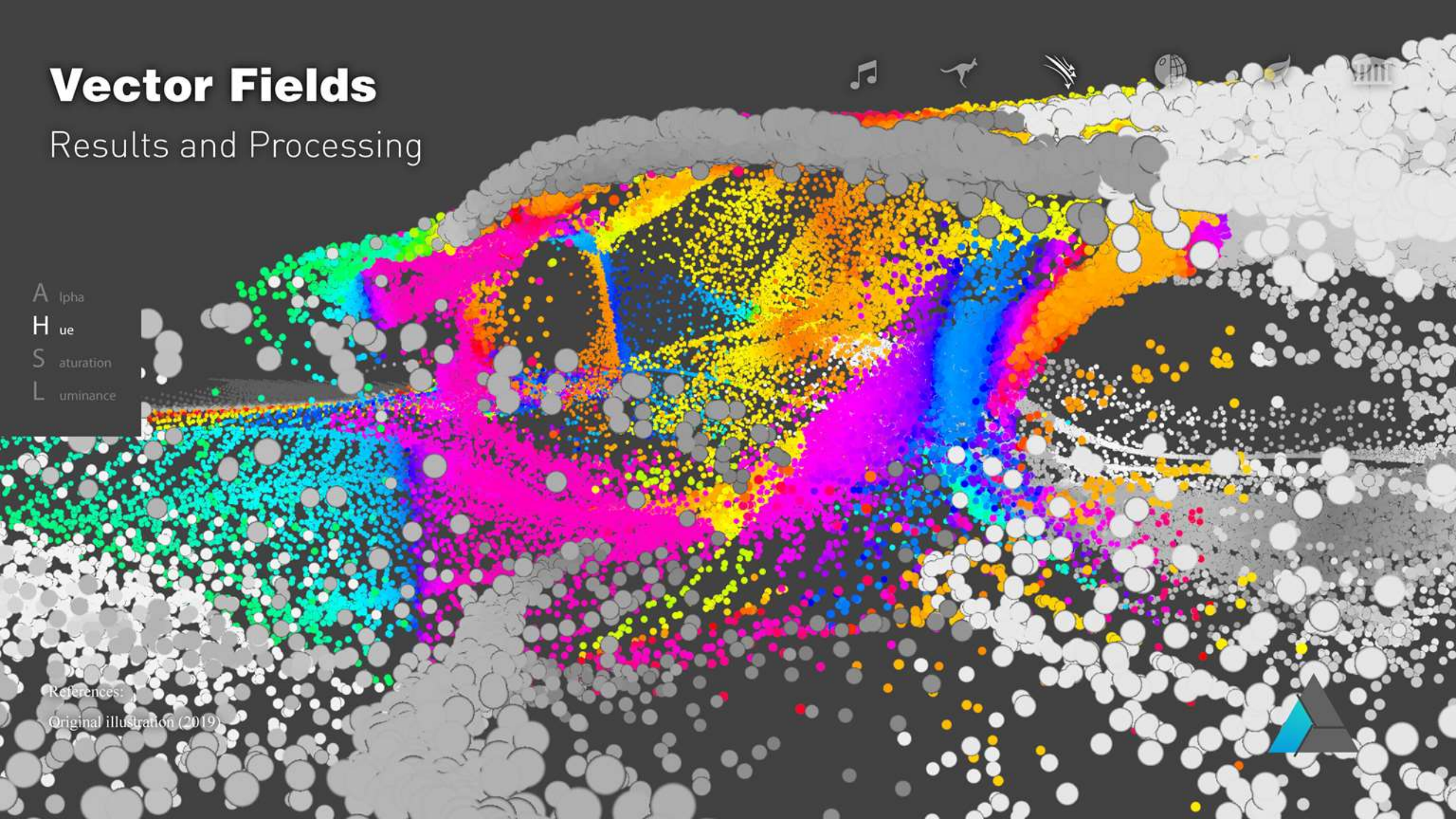


References:

Original illustration (2019)

Vector Fields

Results and Processing



Reed Flute Cave

Guangxi, China

References:

bobomcduffy, imgur.com, 2014

Reed Flute Cave

Guangxi, China

References:

Bidtotrip et al., worldfortravel.com, 2015

Reed Flute Cave

Guangxi, China

References:

Wypisz wymaluj Podroz, wypiszwymalujpodroz.pl, n.d.

Reed Flute Cave

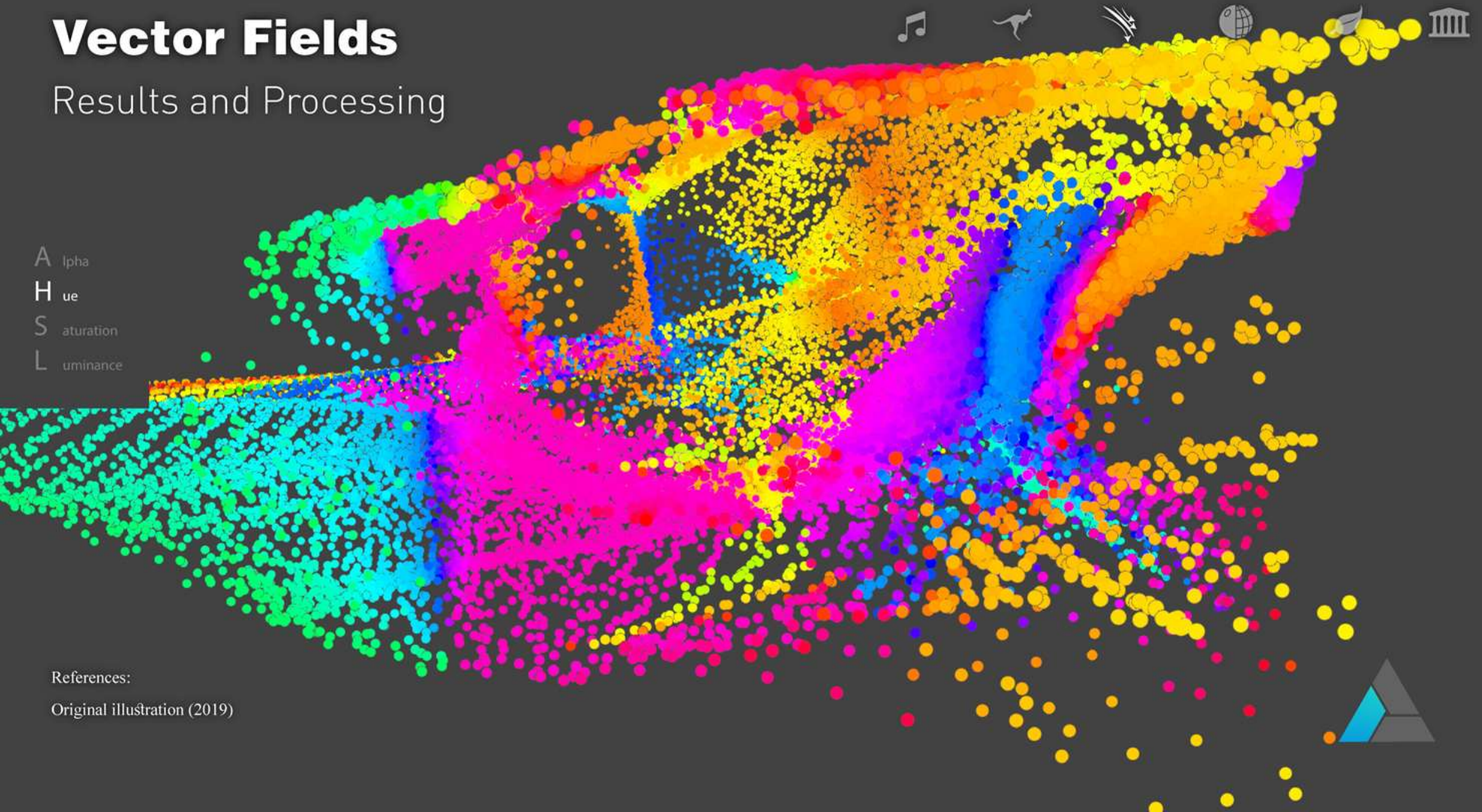
Guangxi, China

References:

bobomcduffy, imgur.com, 2014

Vector Fields

Results and Processing

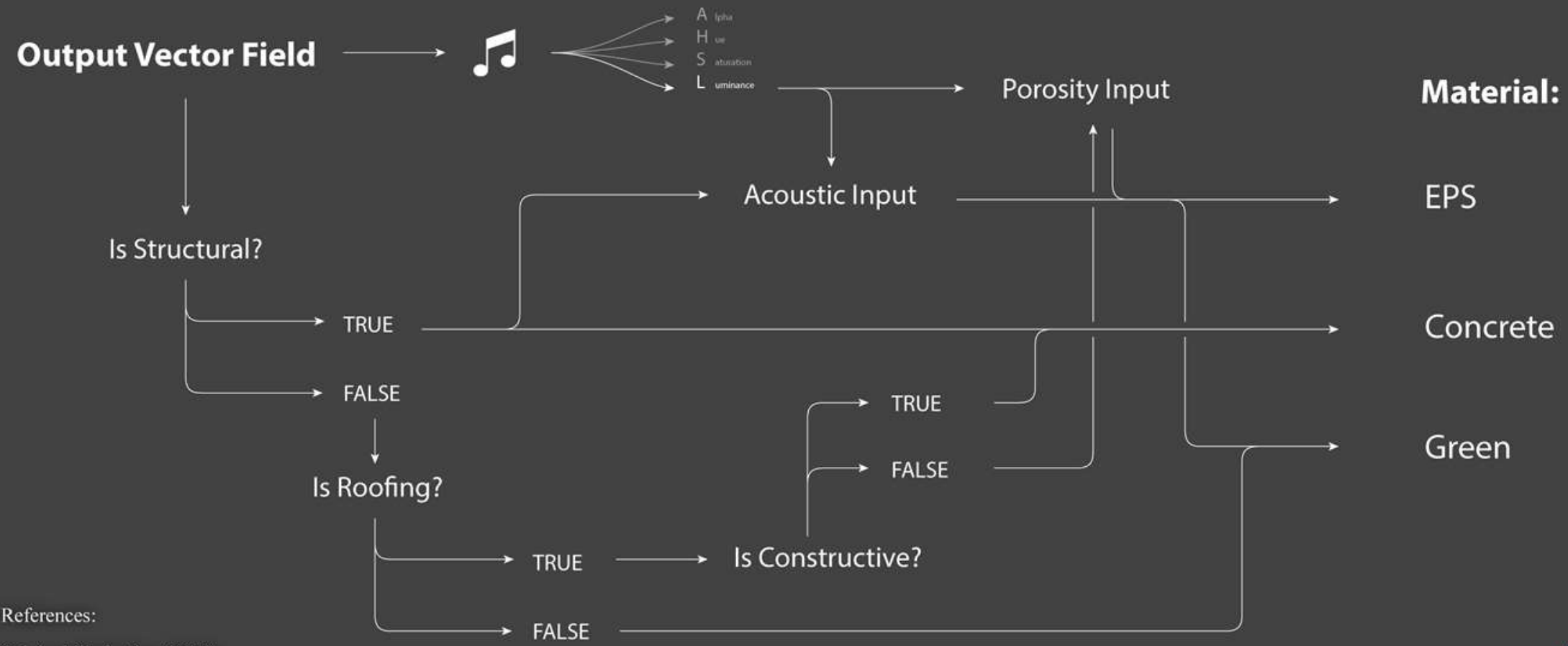


References:

Original illustration (2019)

Material Distribution

Splitting Logic

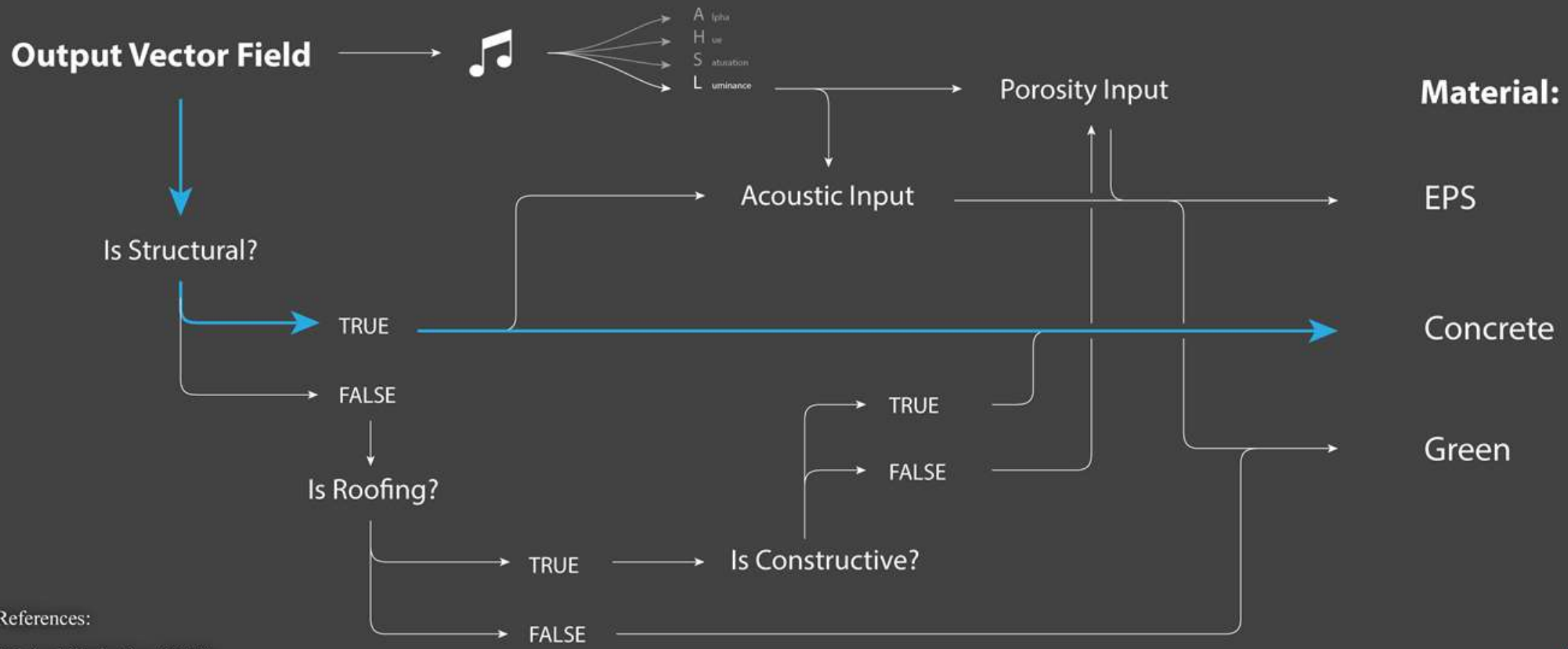


References:

Original illustration (2019)

Material Distribution

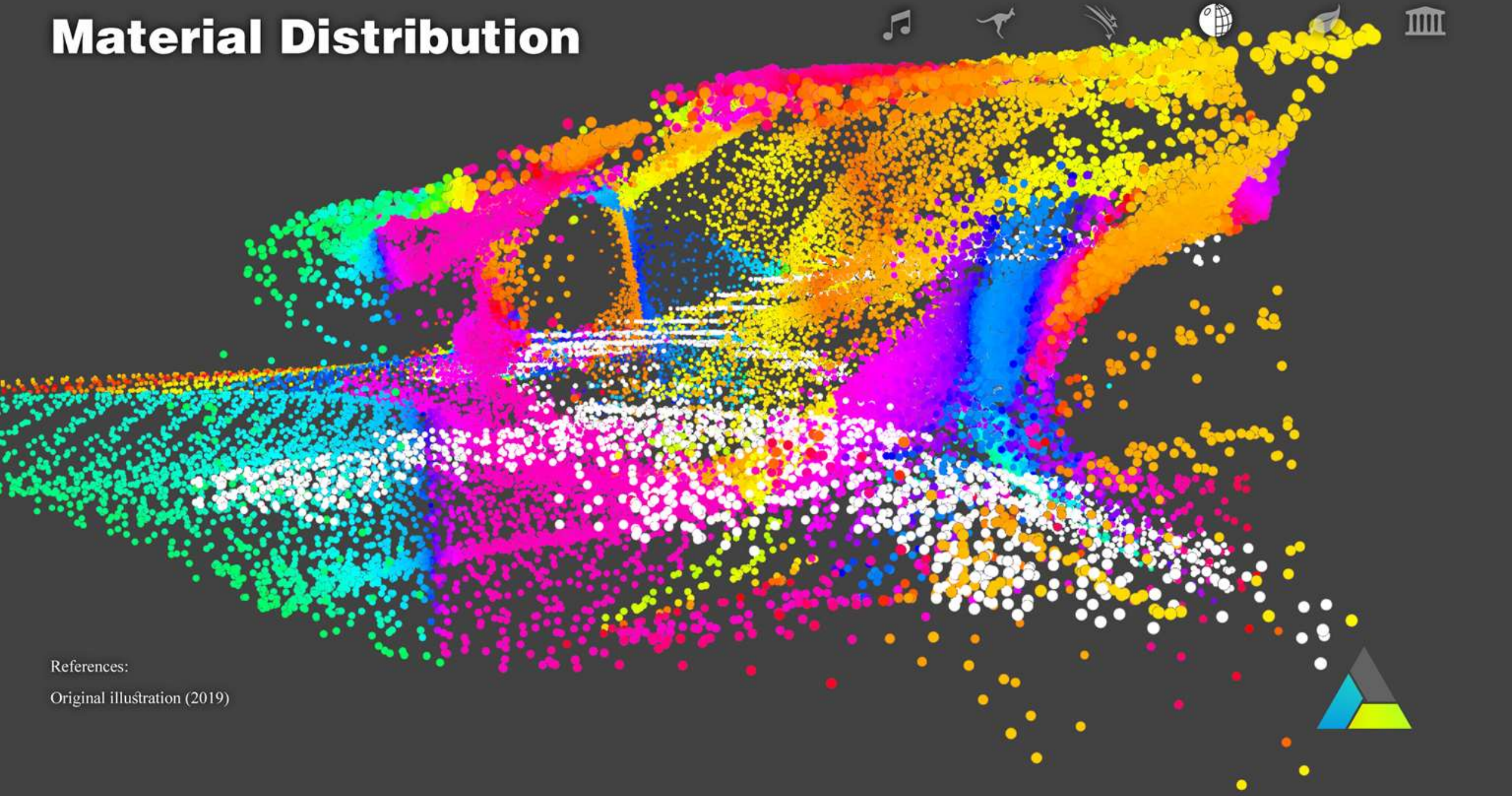
Splitting Logic



References:

Original illustration (2019)

Material Distribution

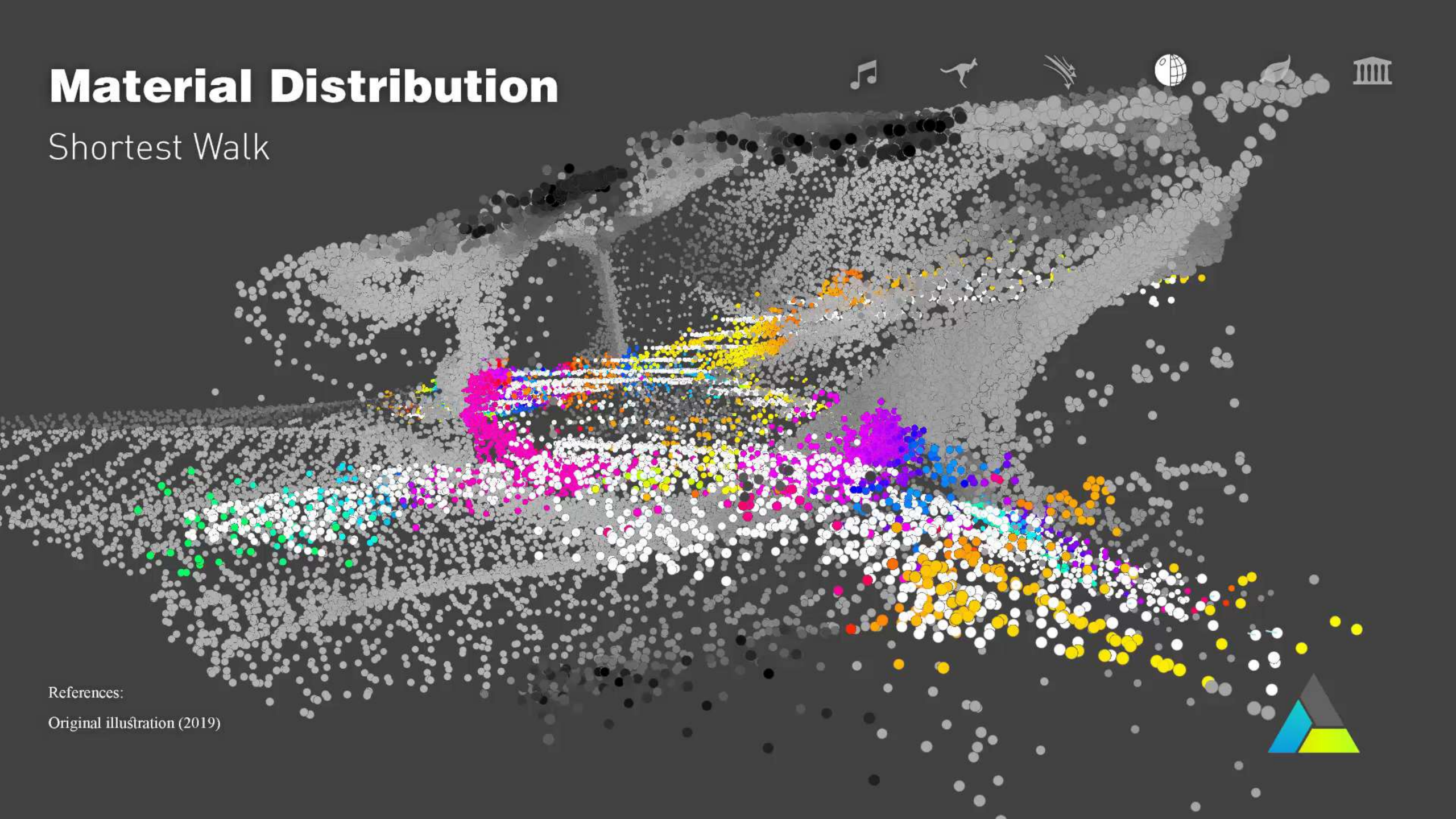


References:

Original illustration (2019)

Material Distribution

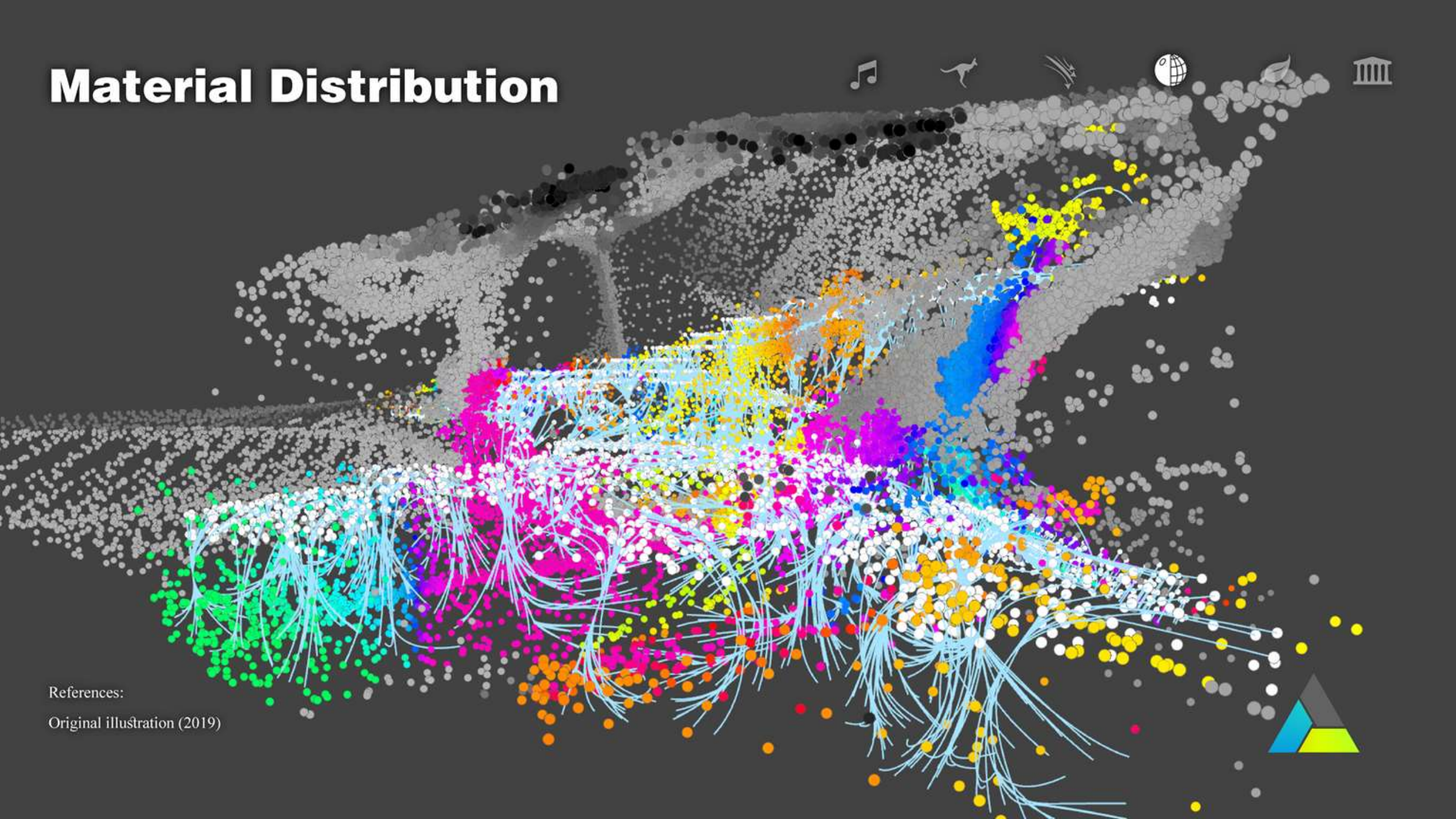
Shortest Walk



References:

Original illustration (2019)

Material Distribution



References:

Original illustration (2019)

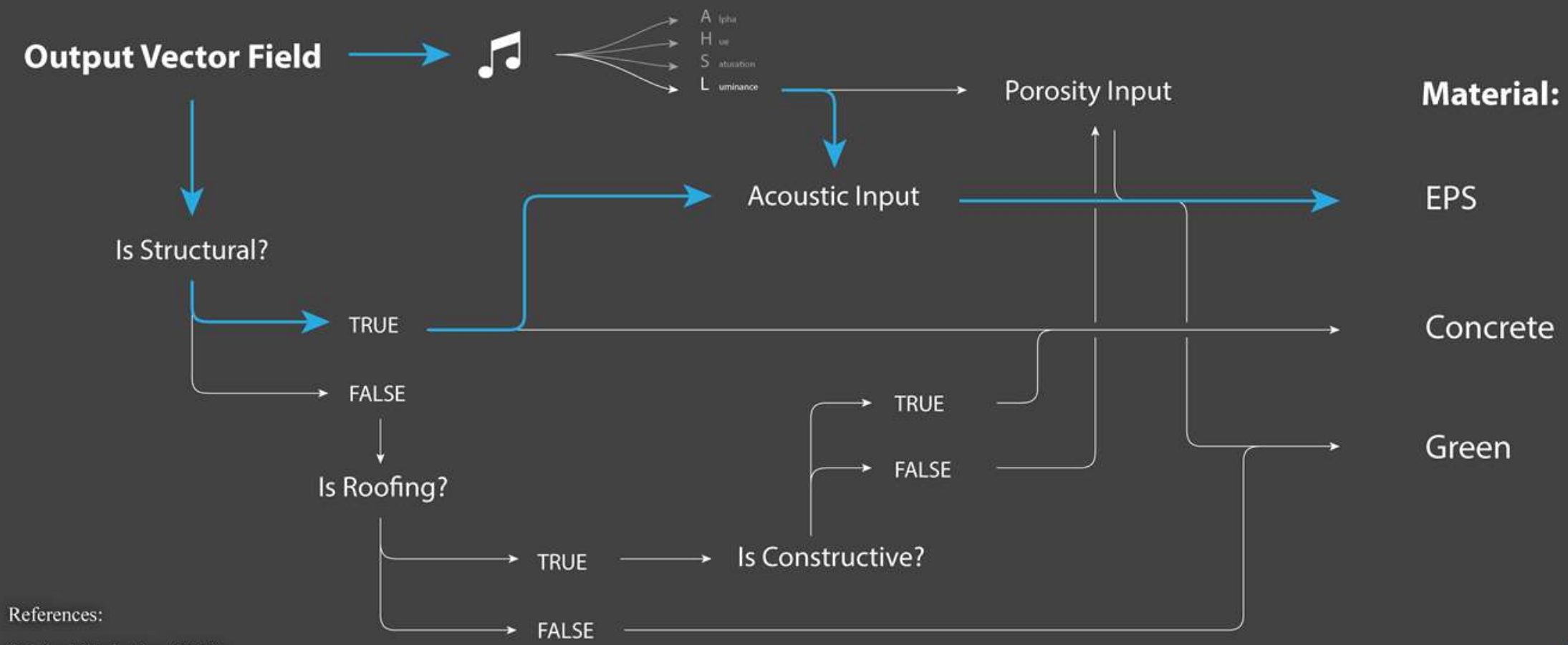
Material Distribution

References:

Original illustration (2019)

Material Distribution

Splitting Logic



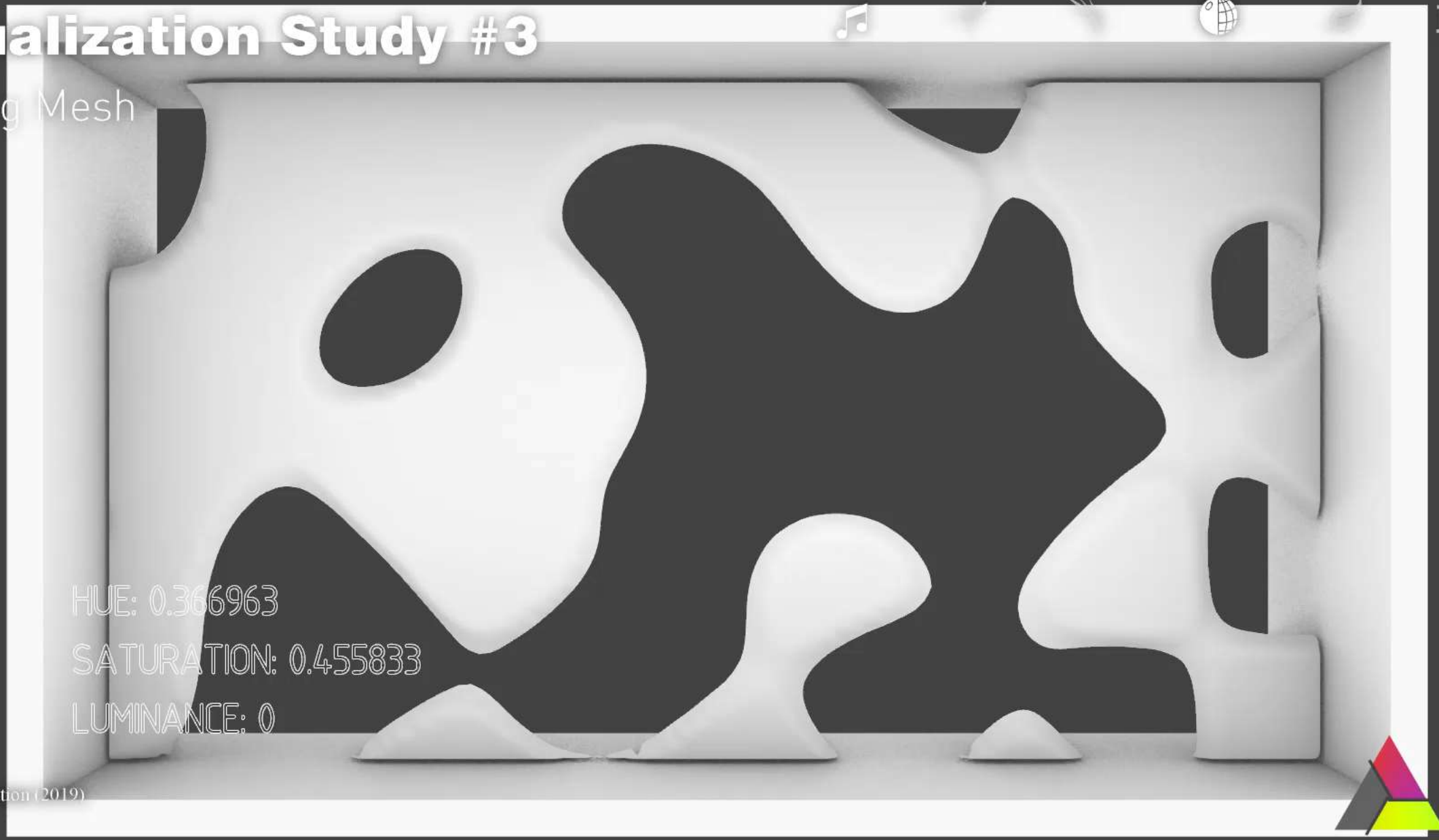
References:

Original illustration (2019)

Visualization Study #3

Melting Mesh

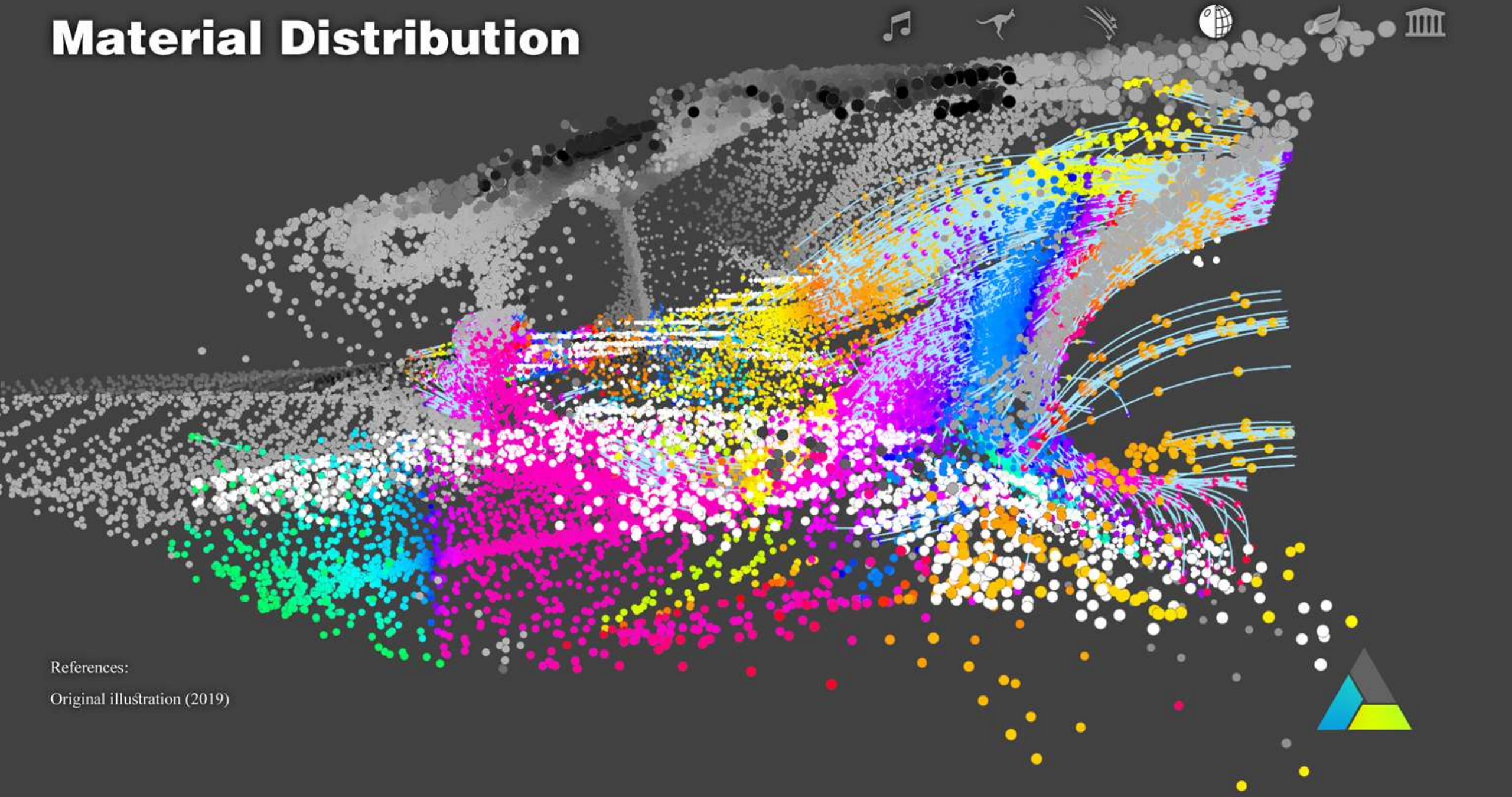
A lpha
H ue
S aturation
L uminance



References:

Original illustration (2019)

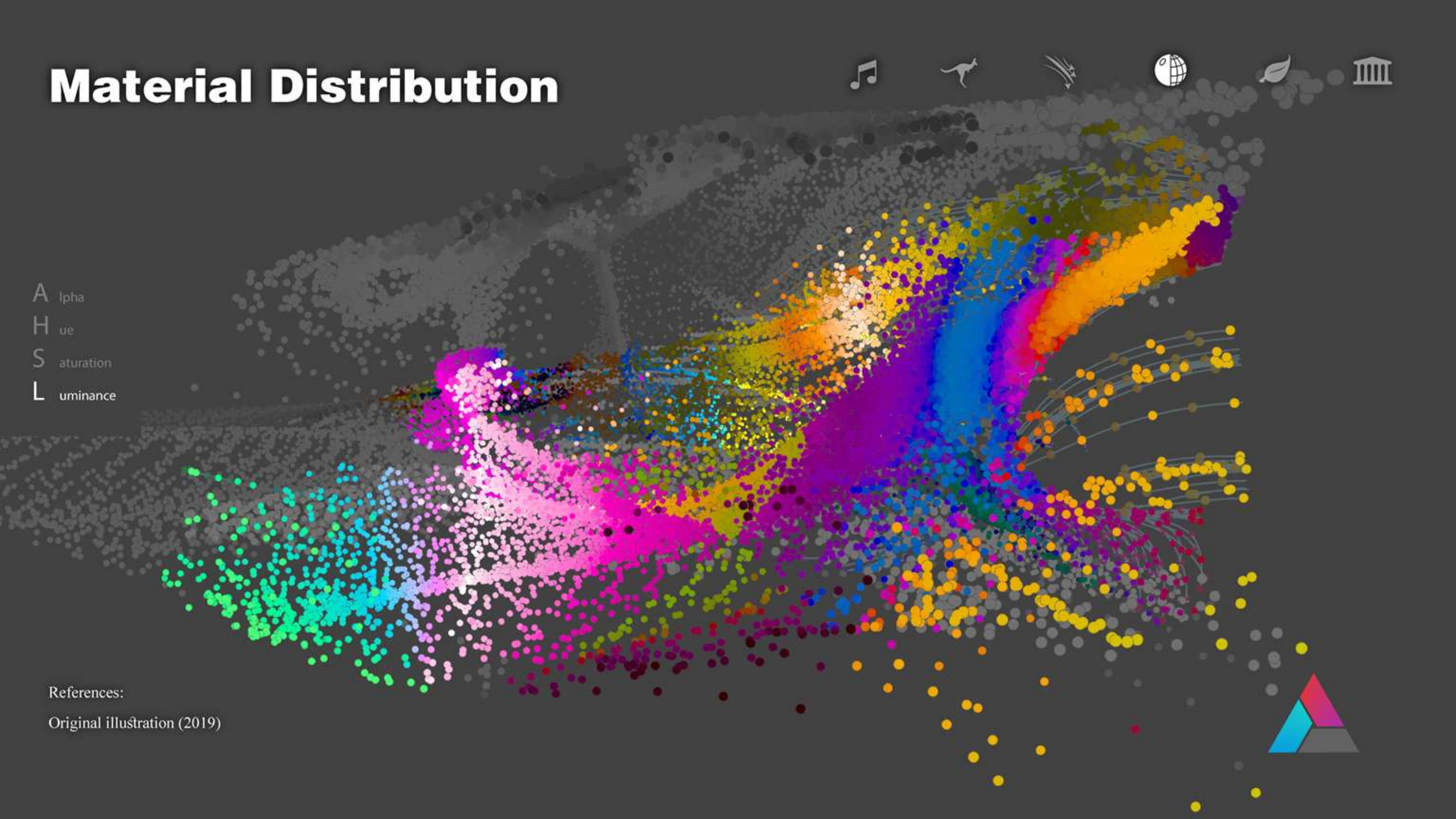
Material Distribution



References:

Original illustration (2019)

Material Distribution



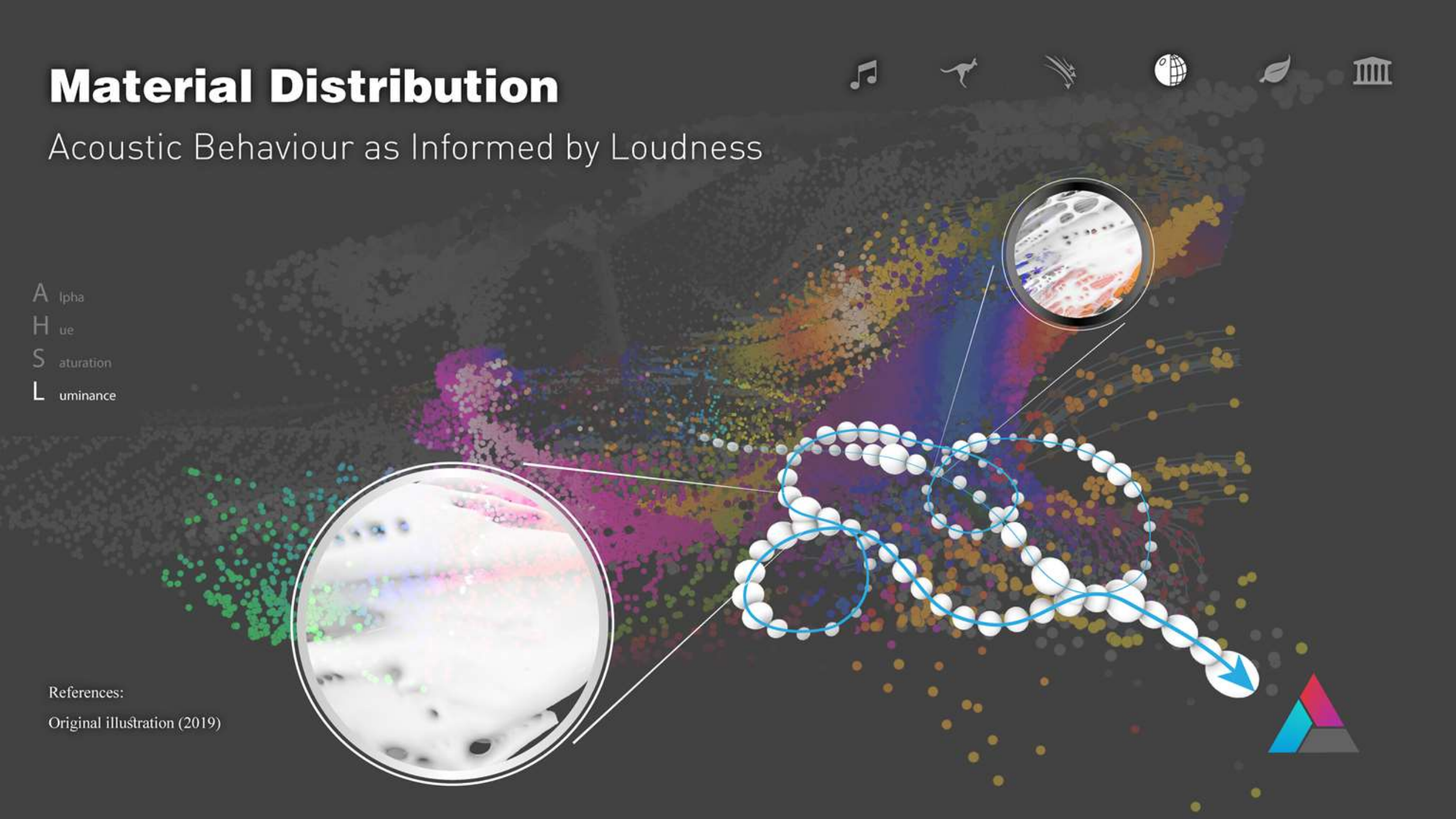
References:

Original illustration (2019)

Material Distribution

Acoustic Behaviour as Informed by Loudness

A lpha
H ue
S aturation
L uminance



References:

Original illustration (2019)

Material Distribution

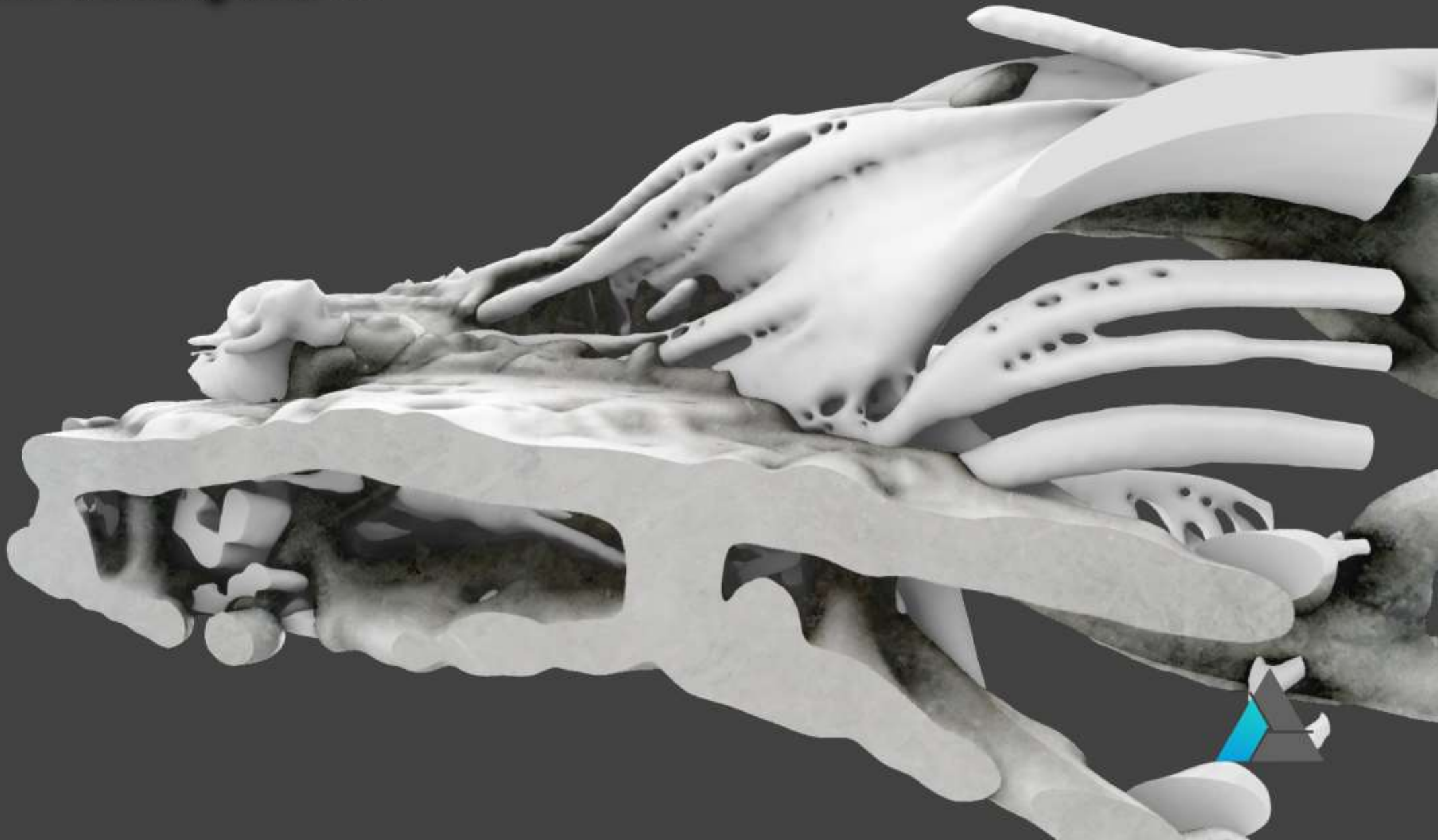
Generative Growth - *Acoustic Pockets*

A lpha
H ue
S aturation
L uminance

References:

Original illustration (2019)

Material Distribution

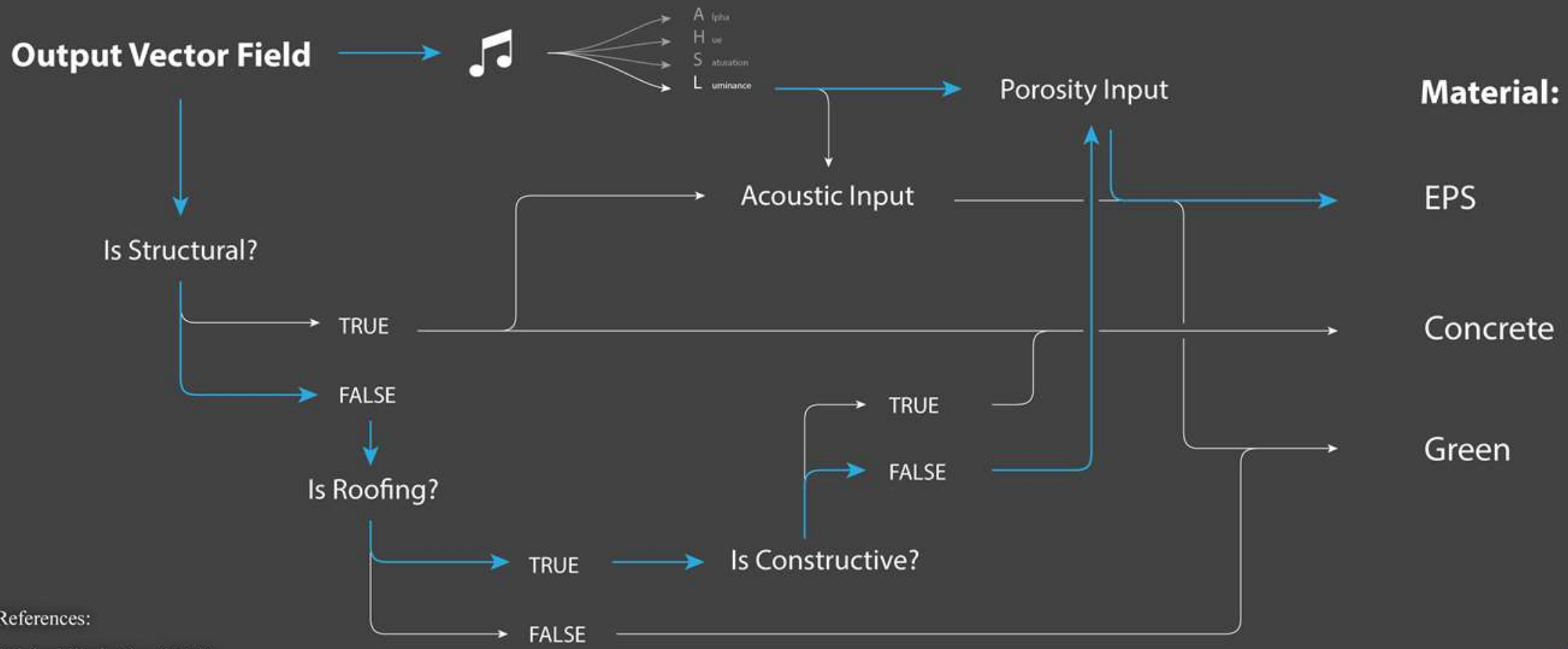


References:

Original Illustration (2019)

Material Distribution

Splitting Logic

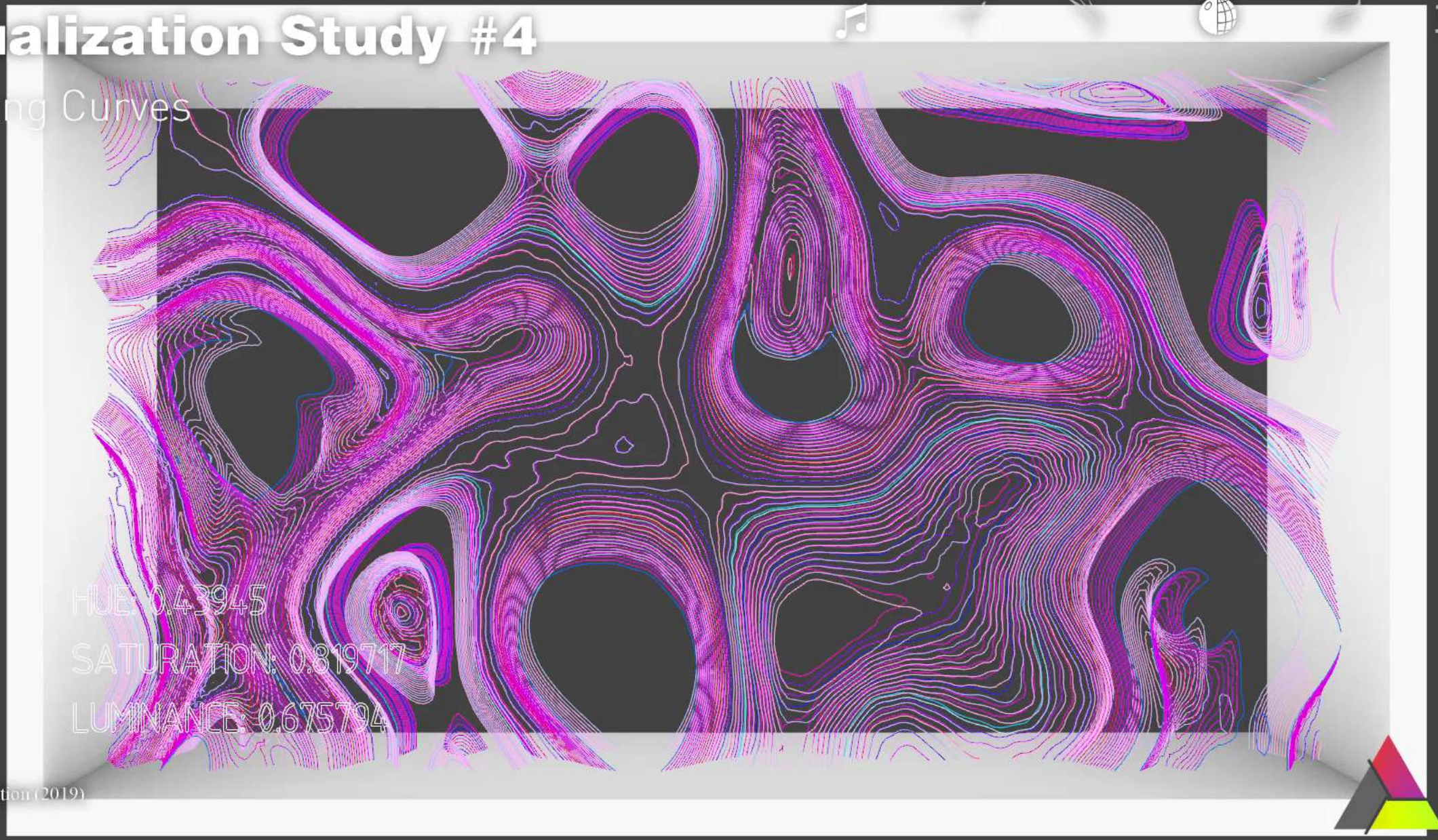


References:

Original illustration (2019)

Visualization Study #4

Crawling Curves

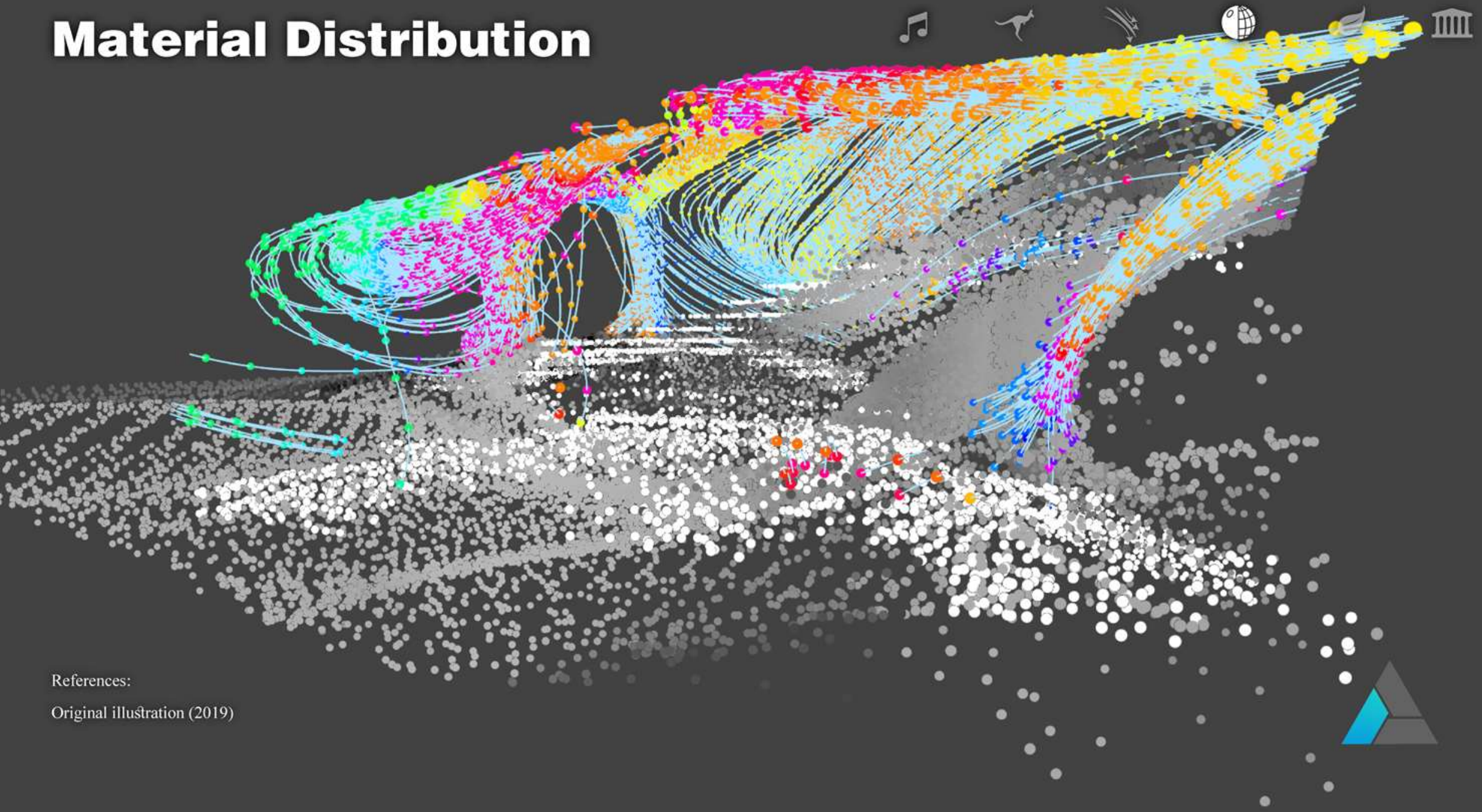


A lpha
H ue
S aturation
L uminance

References:

Original illustration (2019)

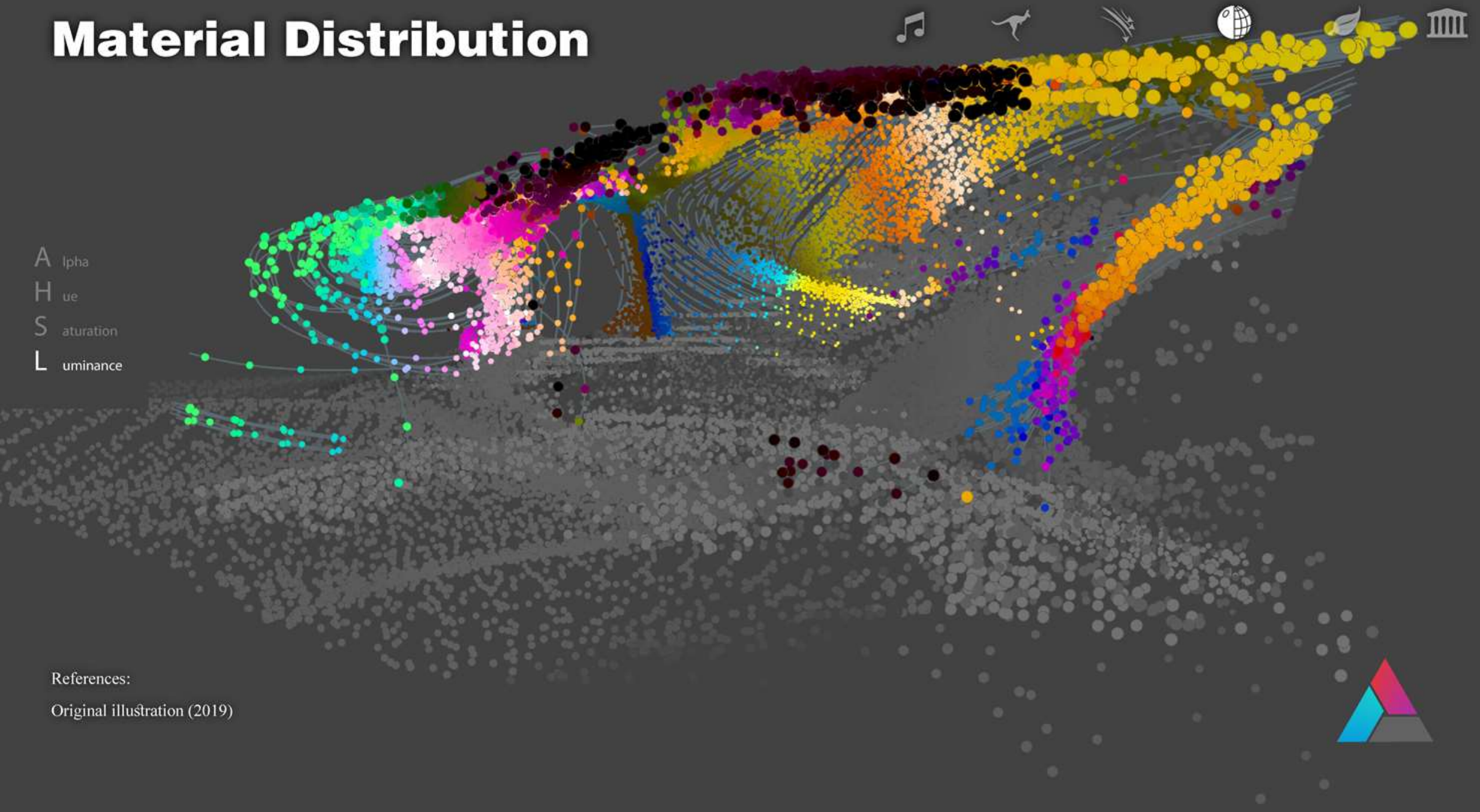
Material Distribution



References:

Original illustration (2019)

Material Distribution

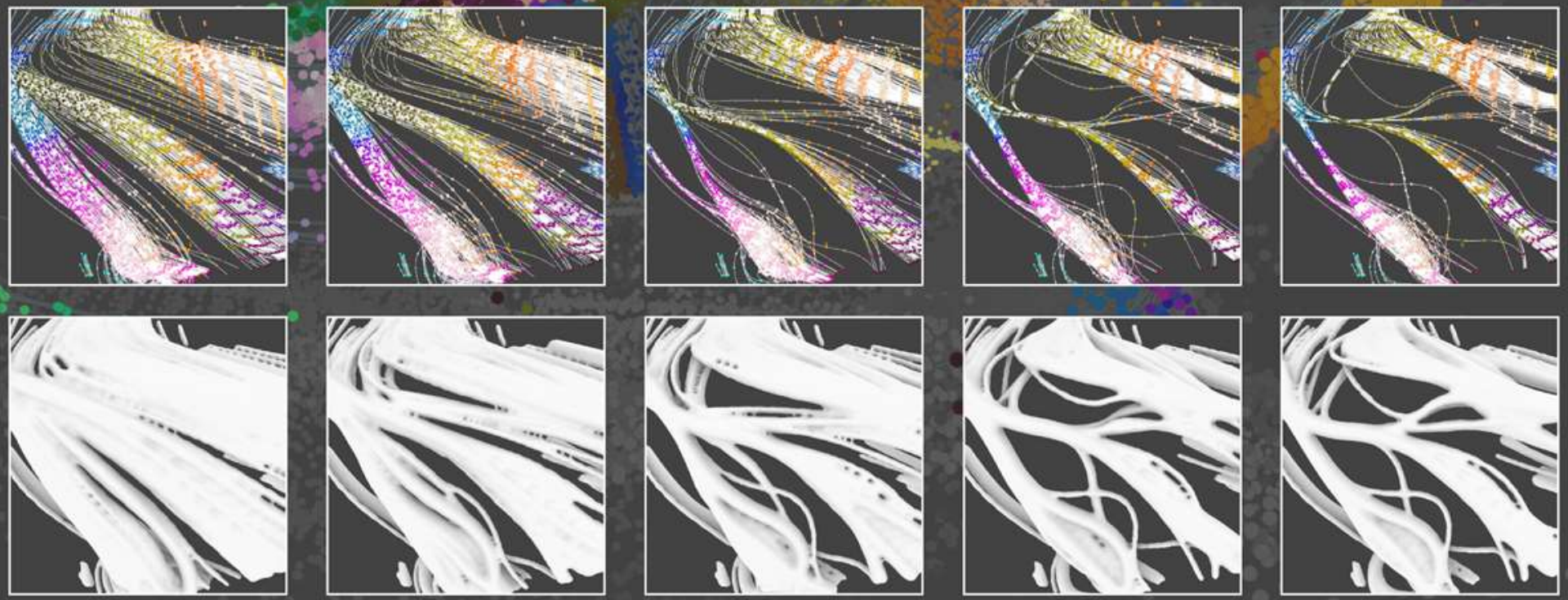


References:

Original illustration (2019)

Material Distribution

Curve Bundling by Kernel Density Estimation



A lpha
H ue
S aturation
L uminance

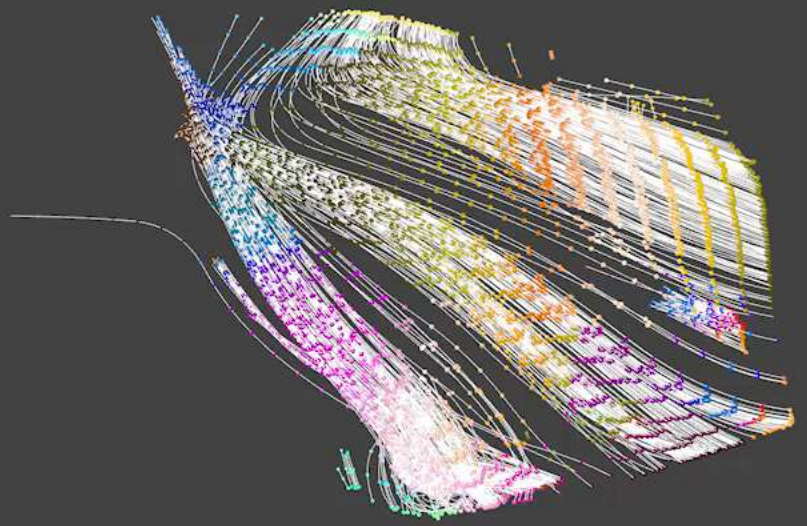
References:

Original illustration (2019)

Material Distribution

Curve Bundling by Kernel Density Estimation

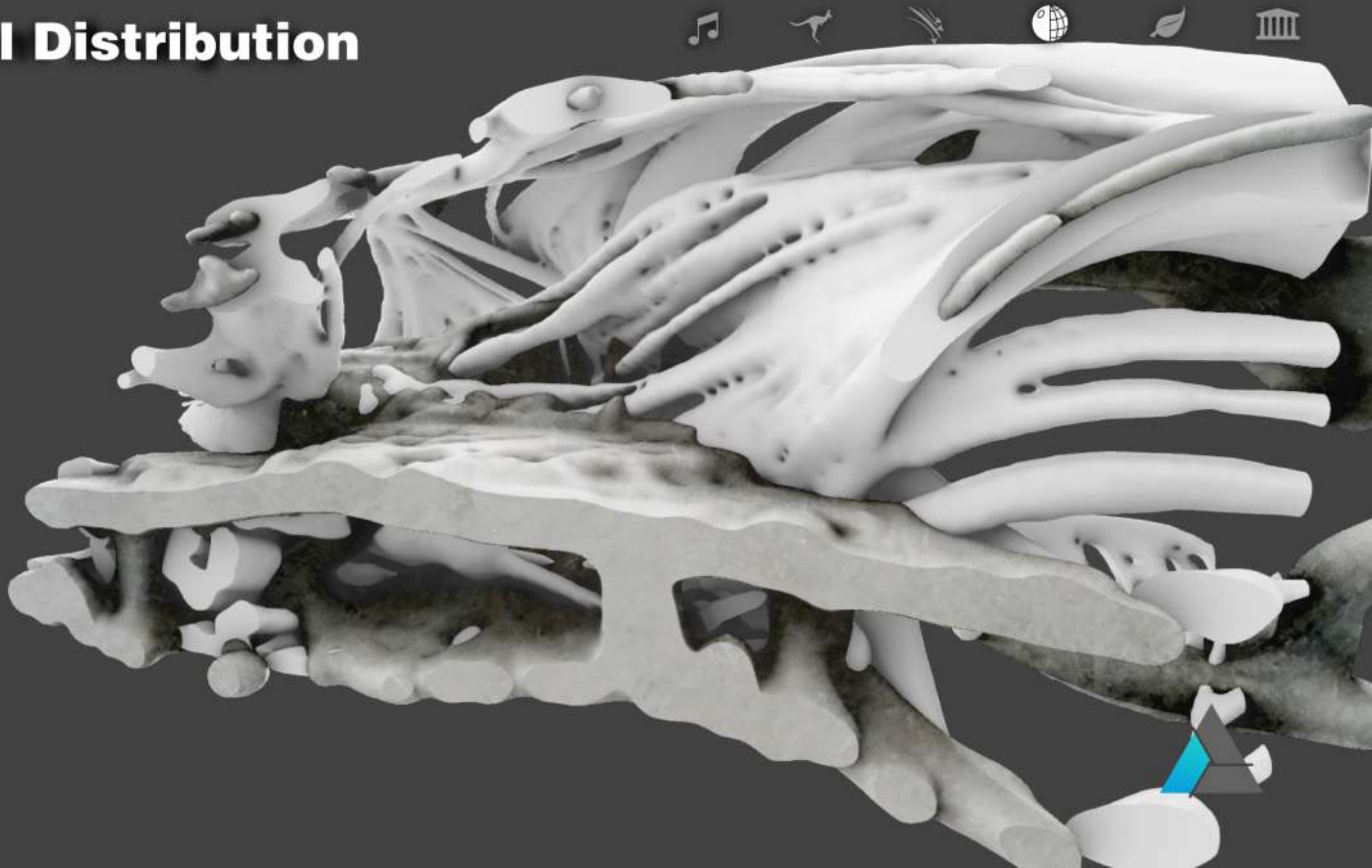
A lpha
H ue
S aturation
L uminance



References:

Original illustration (2019)

Material Distribution

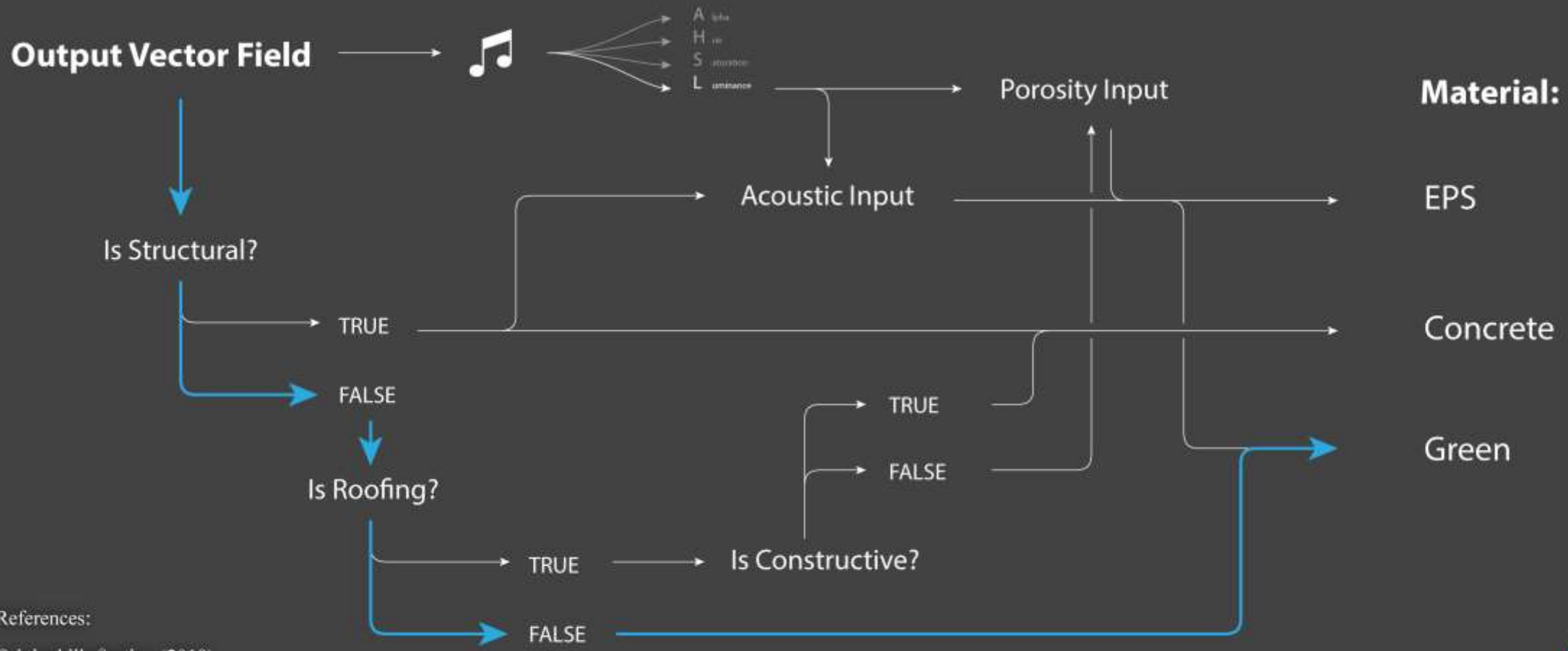


References:

Original Illustration (2019)

Material Distribution

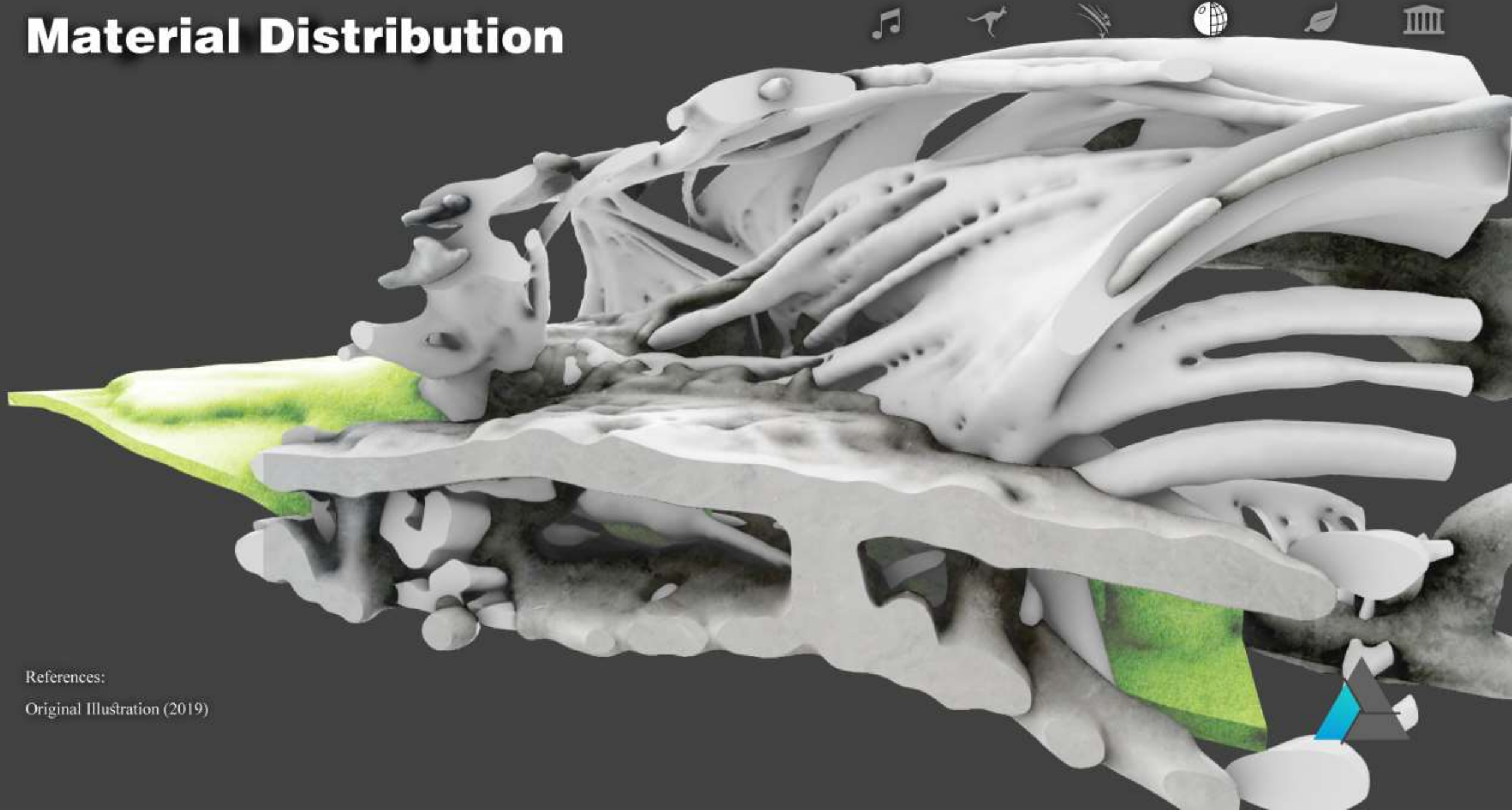
Splitting Logic



References:

Original illustration (2019)

Material Distribution

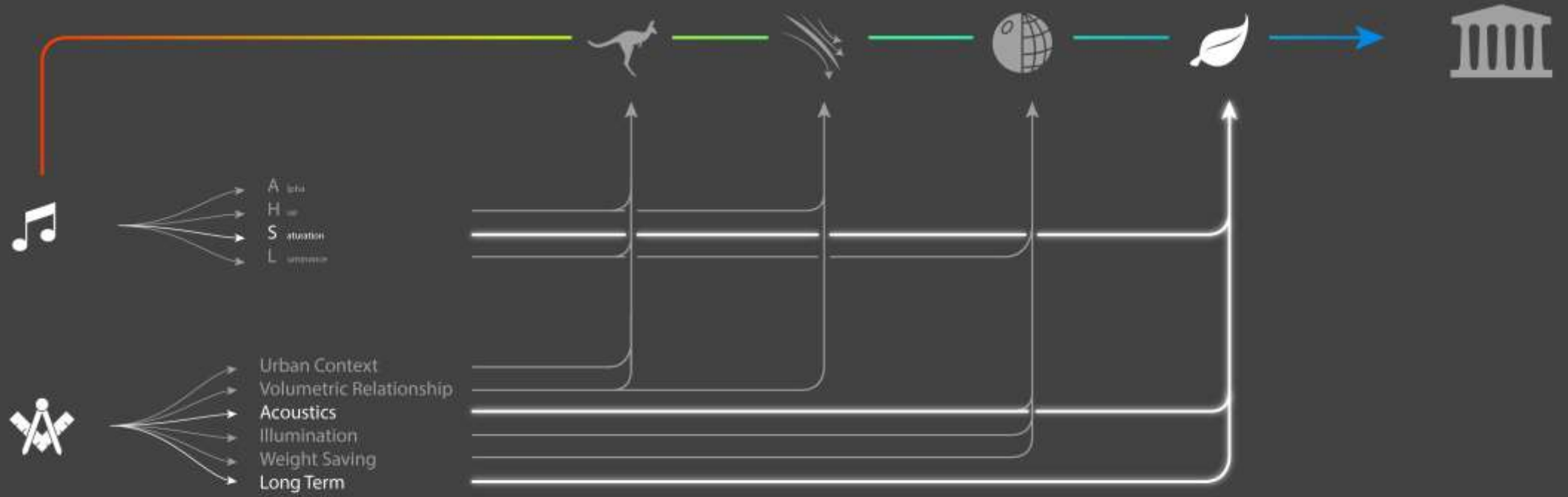


References:

Original Illustration (2019)

Data Flow and Strategy

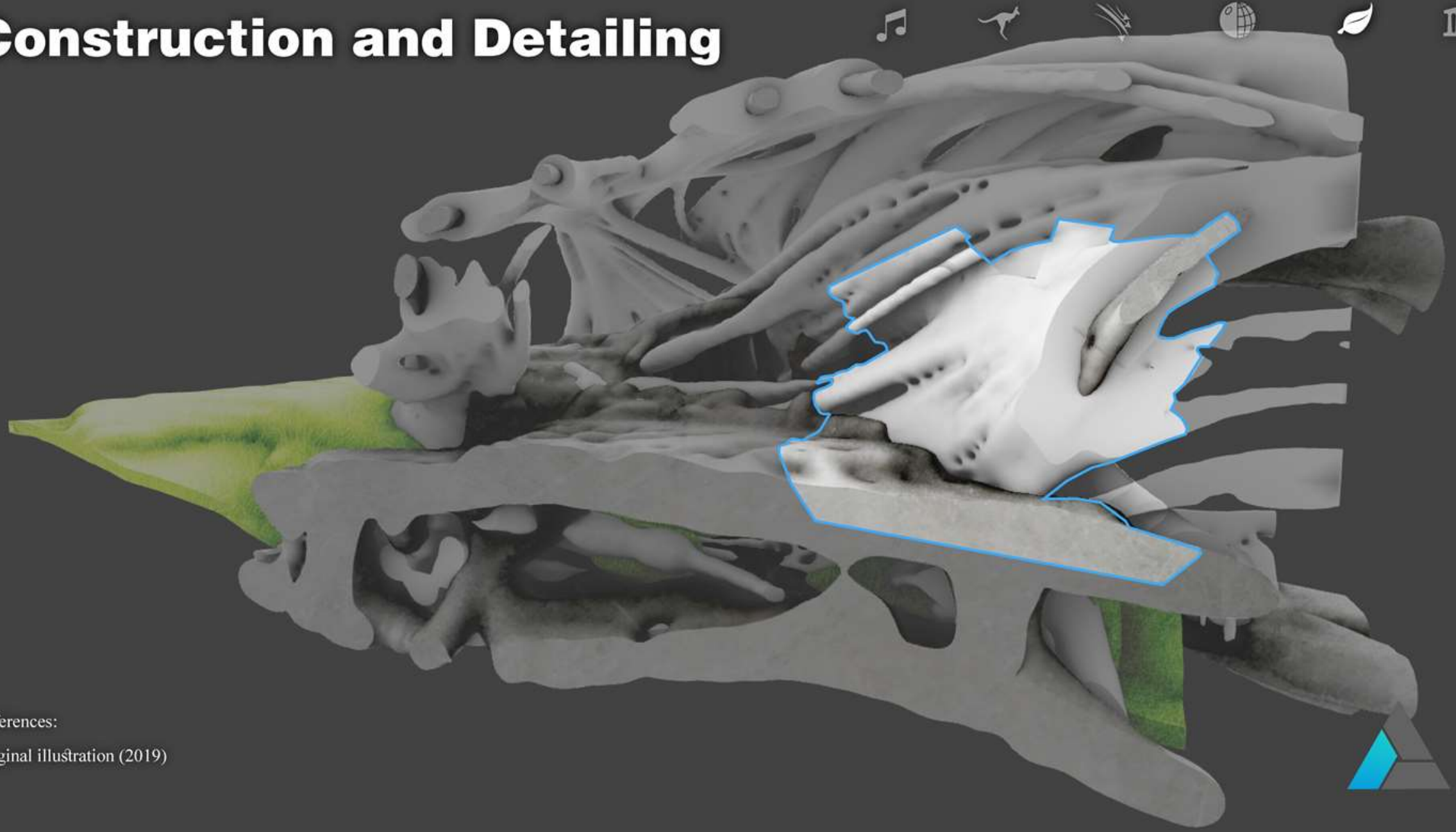
Architectural Input



References:

Original illustration (2019)

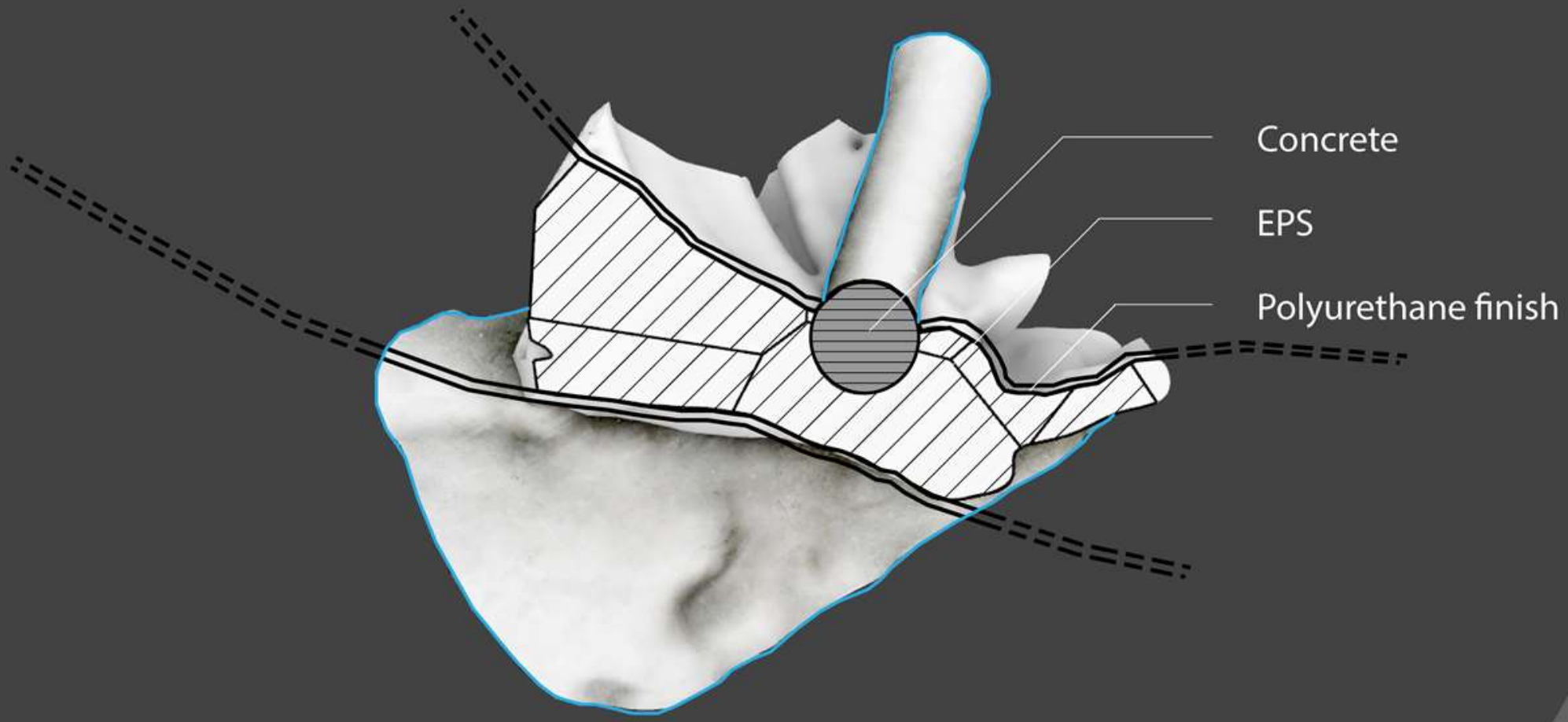
Construction and Detailing



References:

Original illustration (2019)

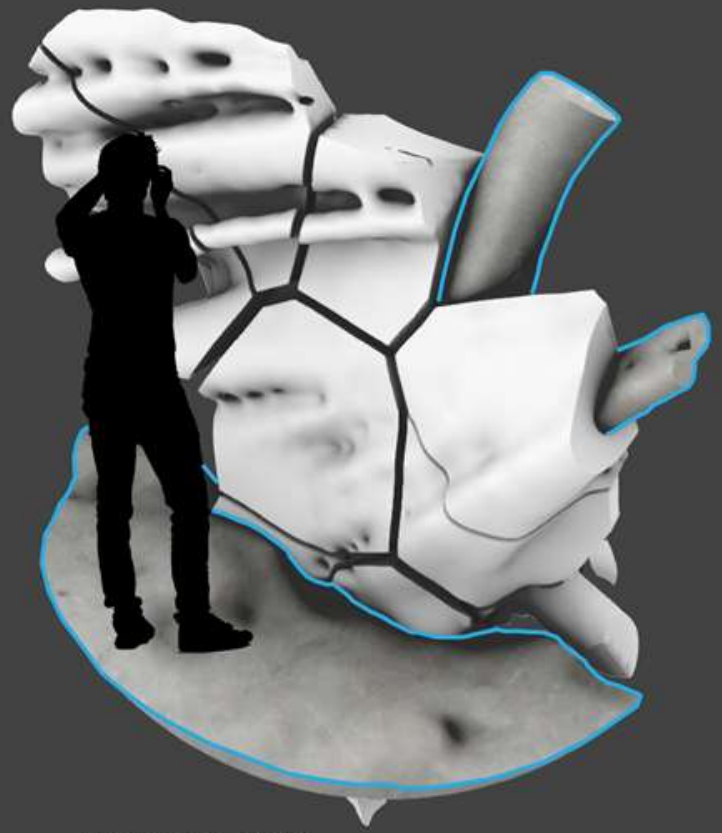
Construction and Detailing



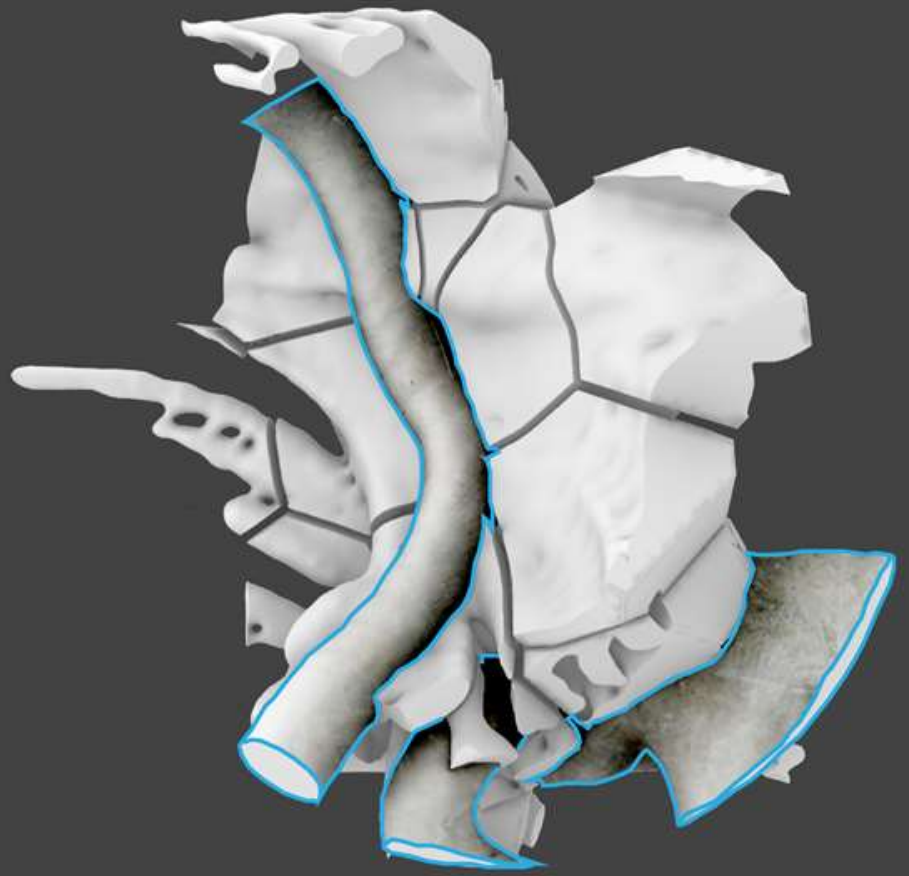
References:

Original illustration (2019)

Construction and Detailing



Fragment - Front

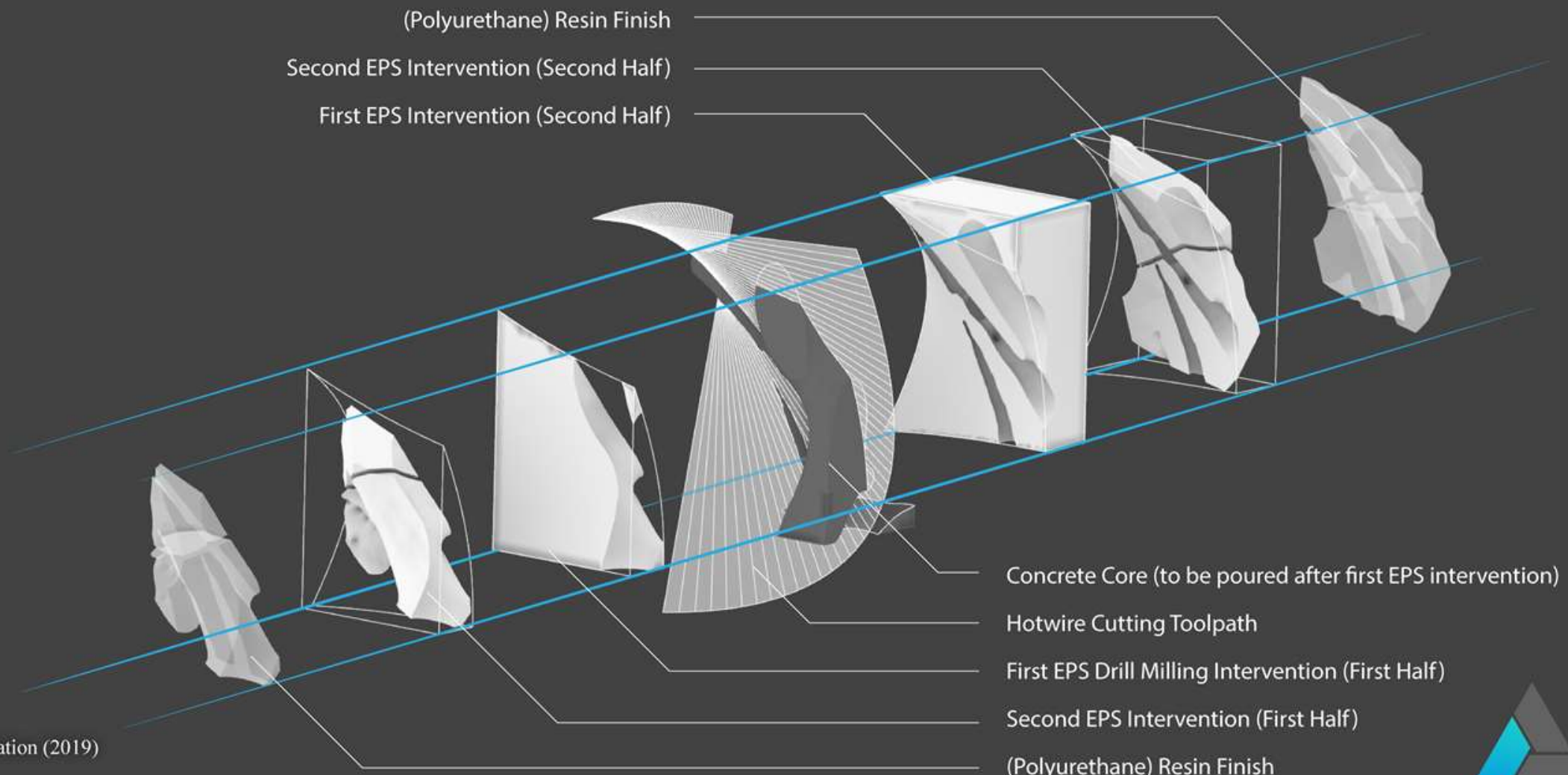


Fragment - Back

References:

Original illustration (2019)

Construction and Detailing

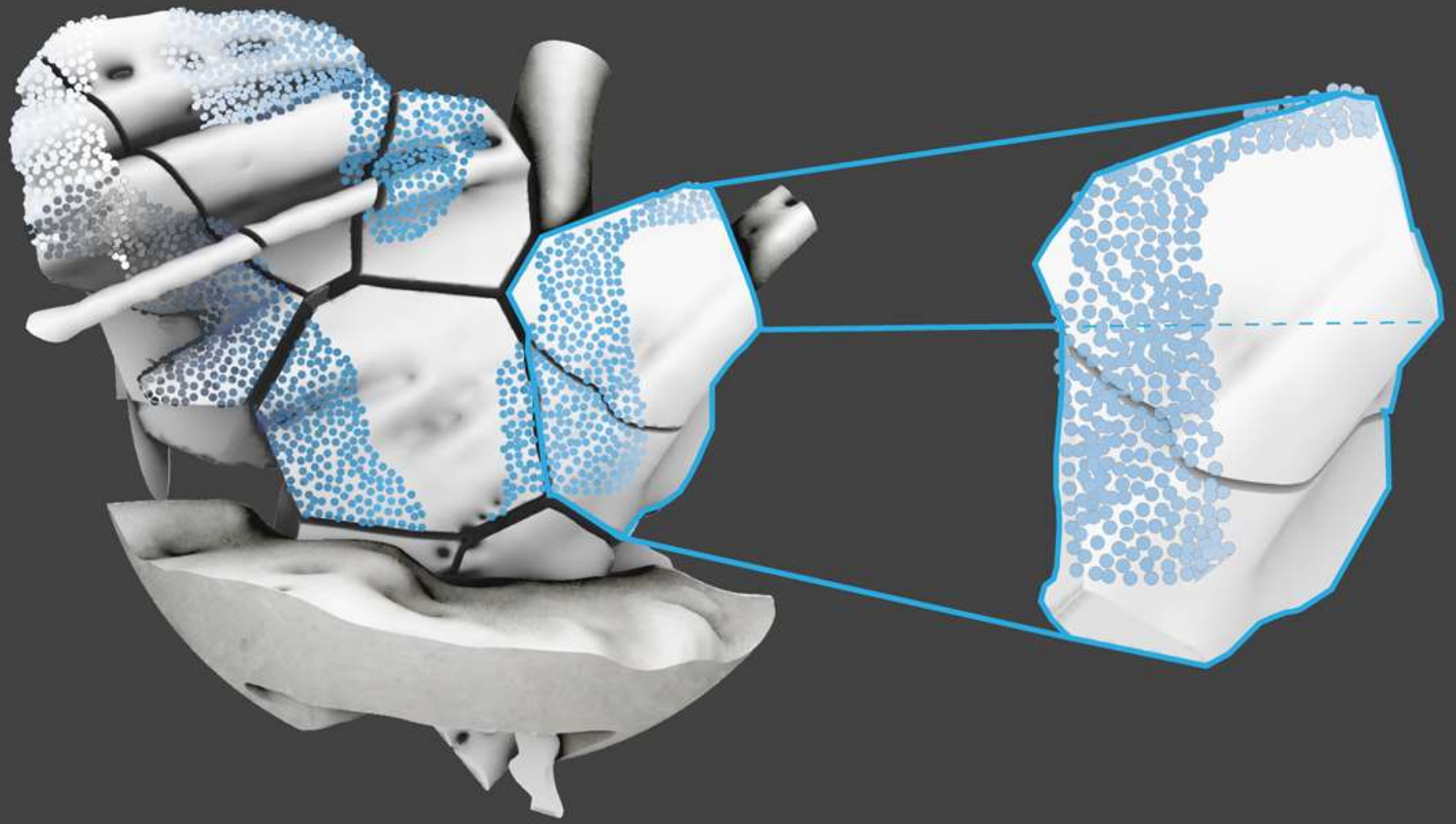


References:

Original illustration (2019)

Construction and Detailing

A lpha
H ue
S aturation
L uminance

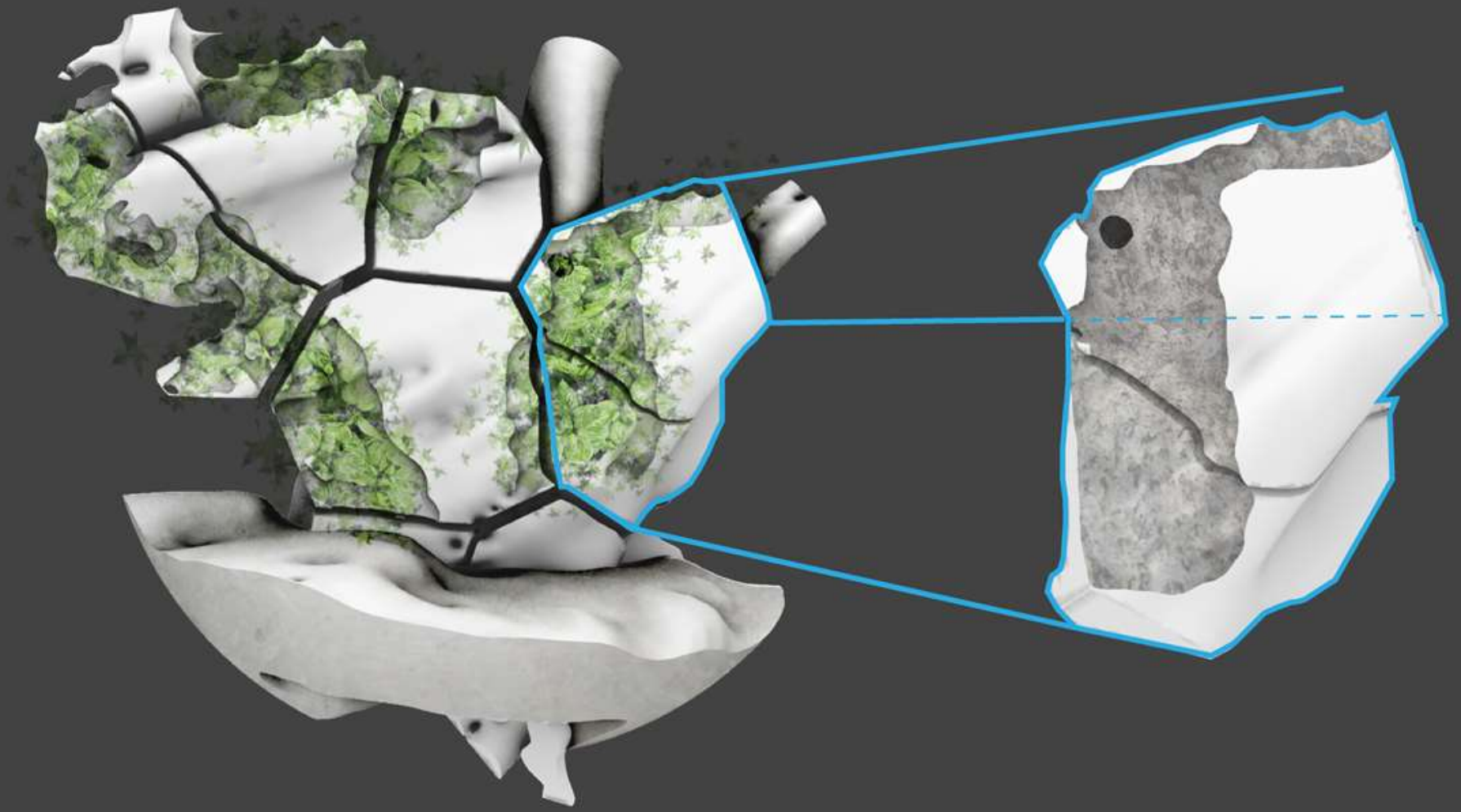


References:

Original illustration (2019)

Construction and Detailing

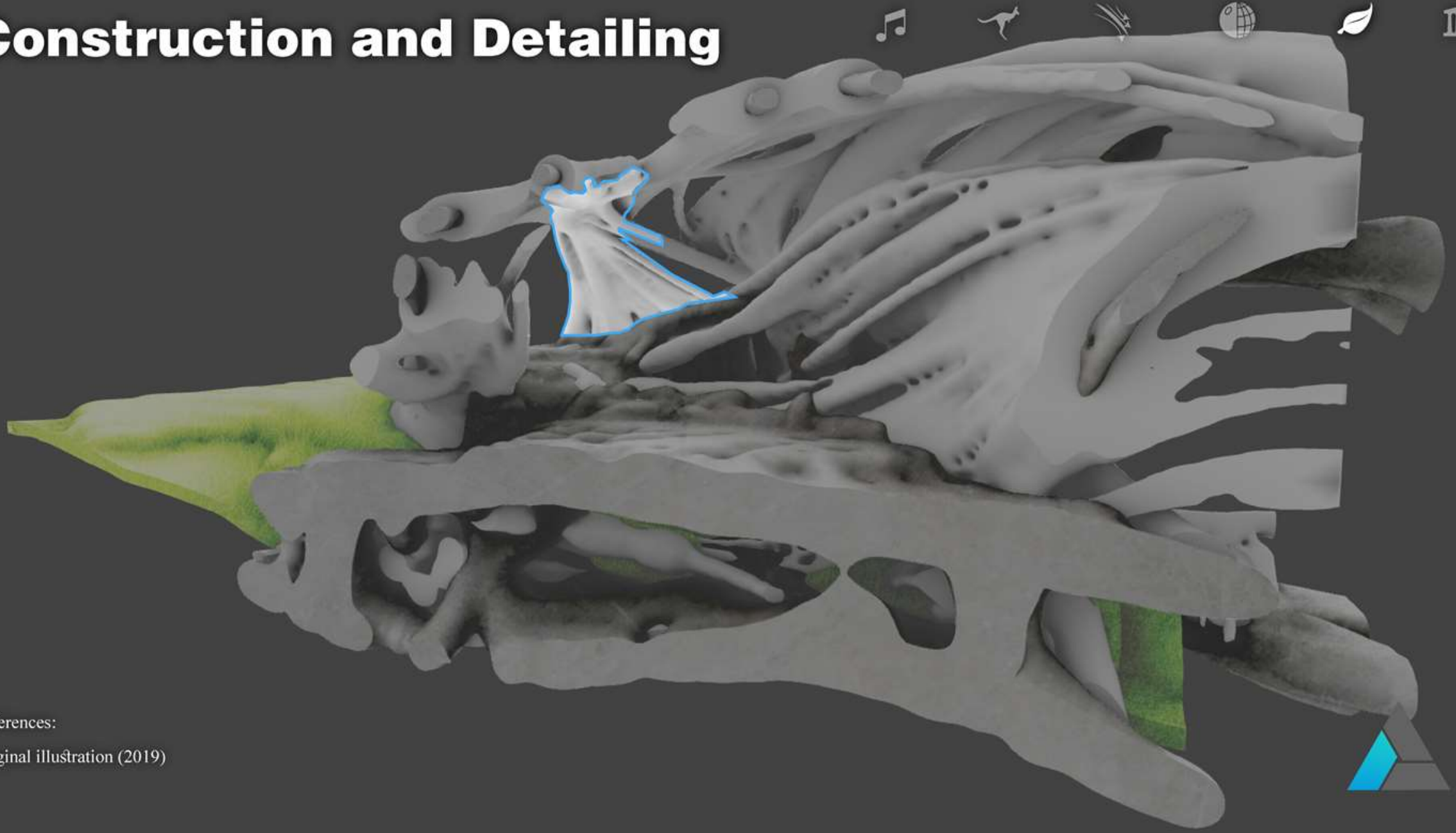
A lpha
H ue
S aturation
L uminance



References:

Original illustration (2019)

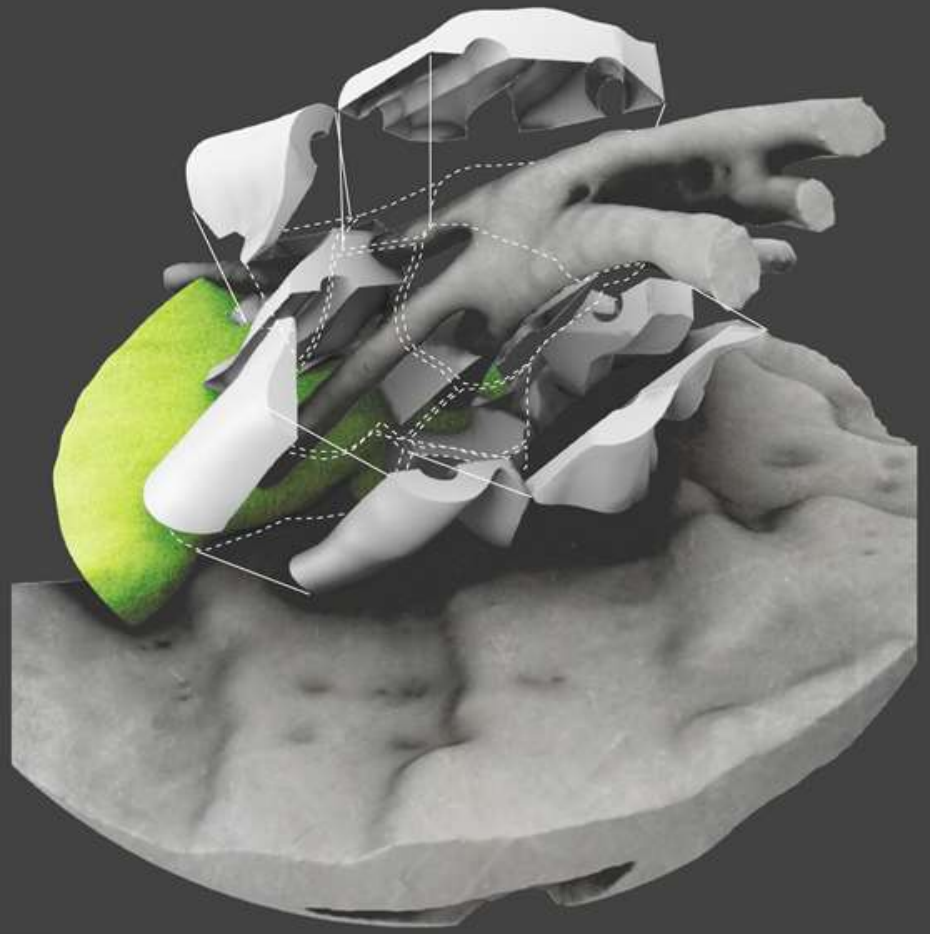
Construction and Detailing

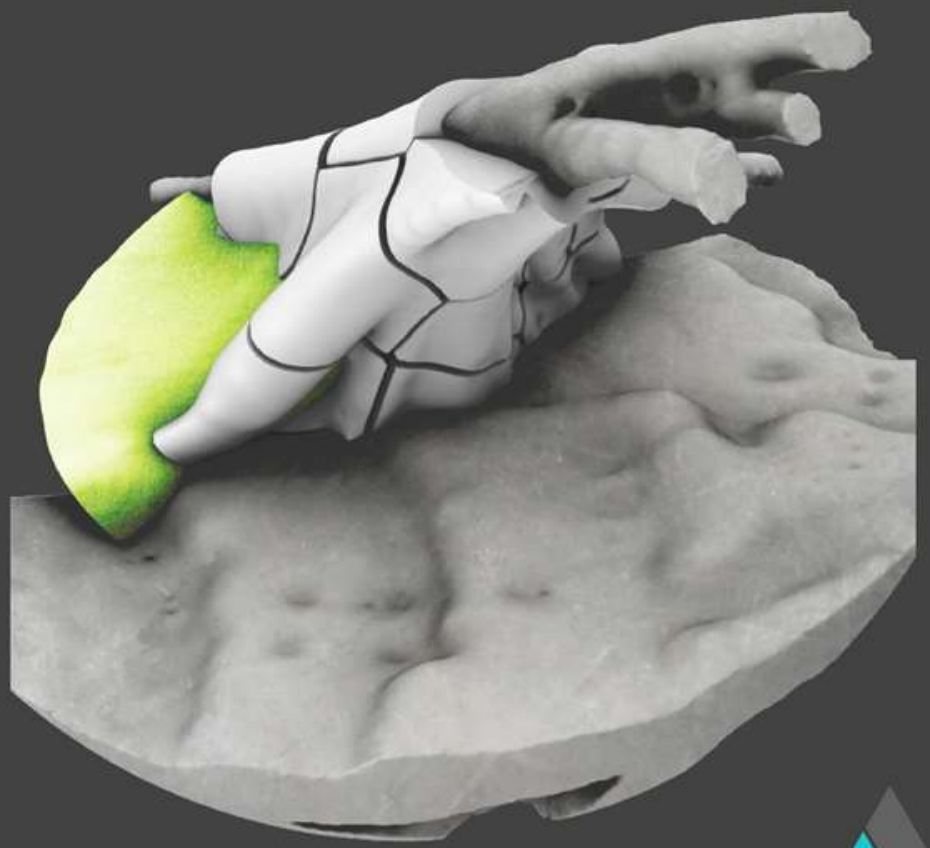


References:

Original illustration (2019)

Construction and Detailing





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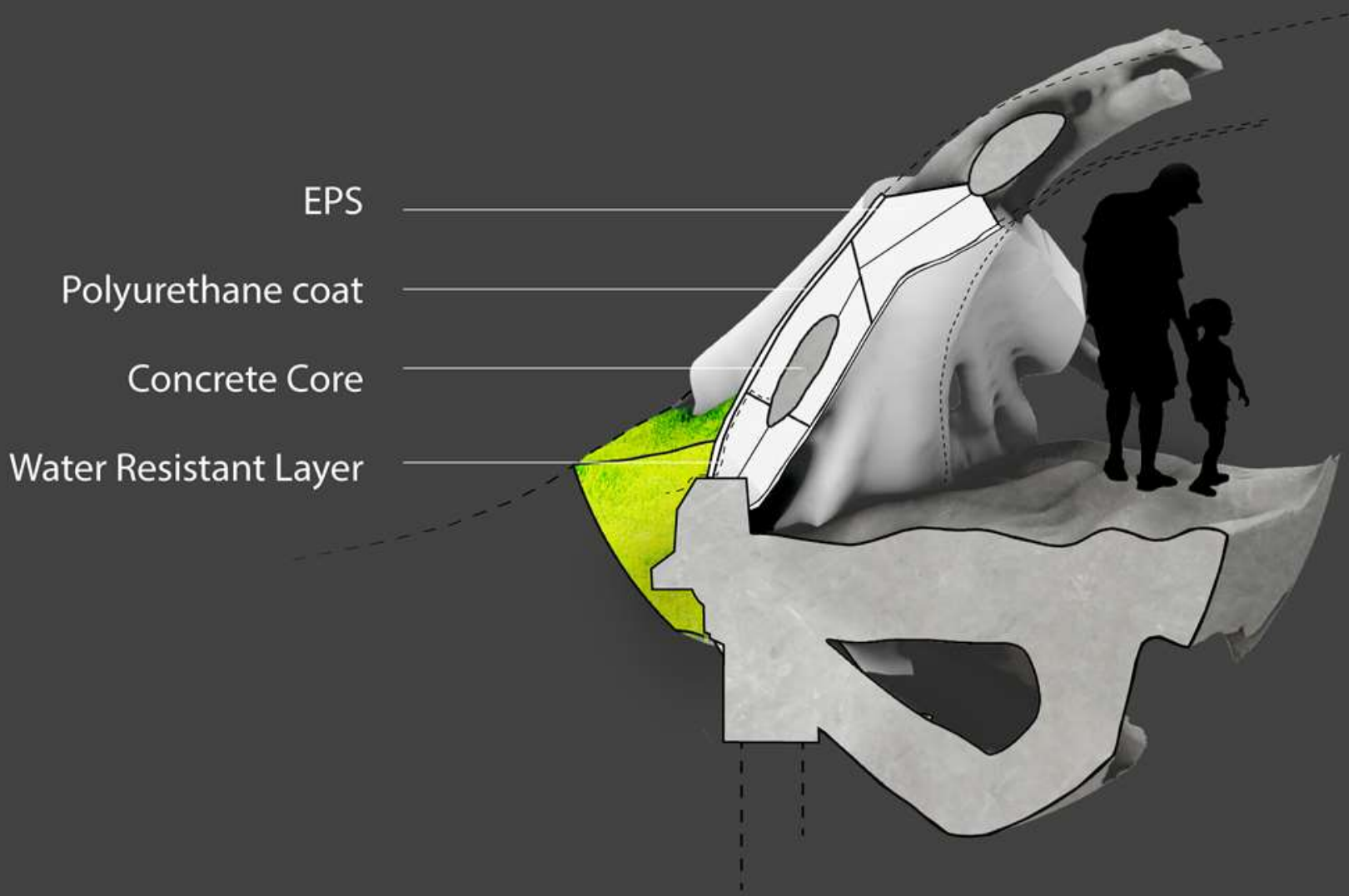
Original illustration (2019)

Construction and Detailing



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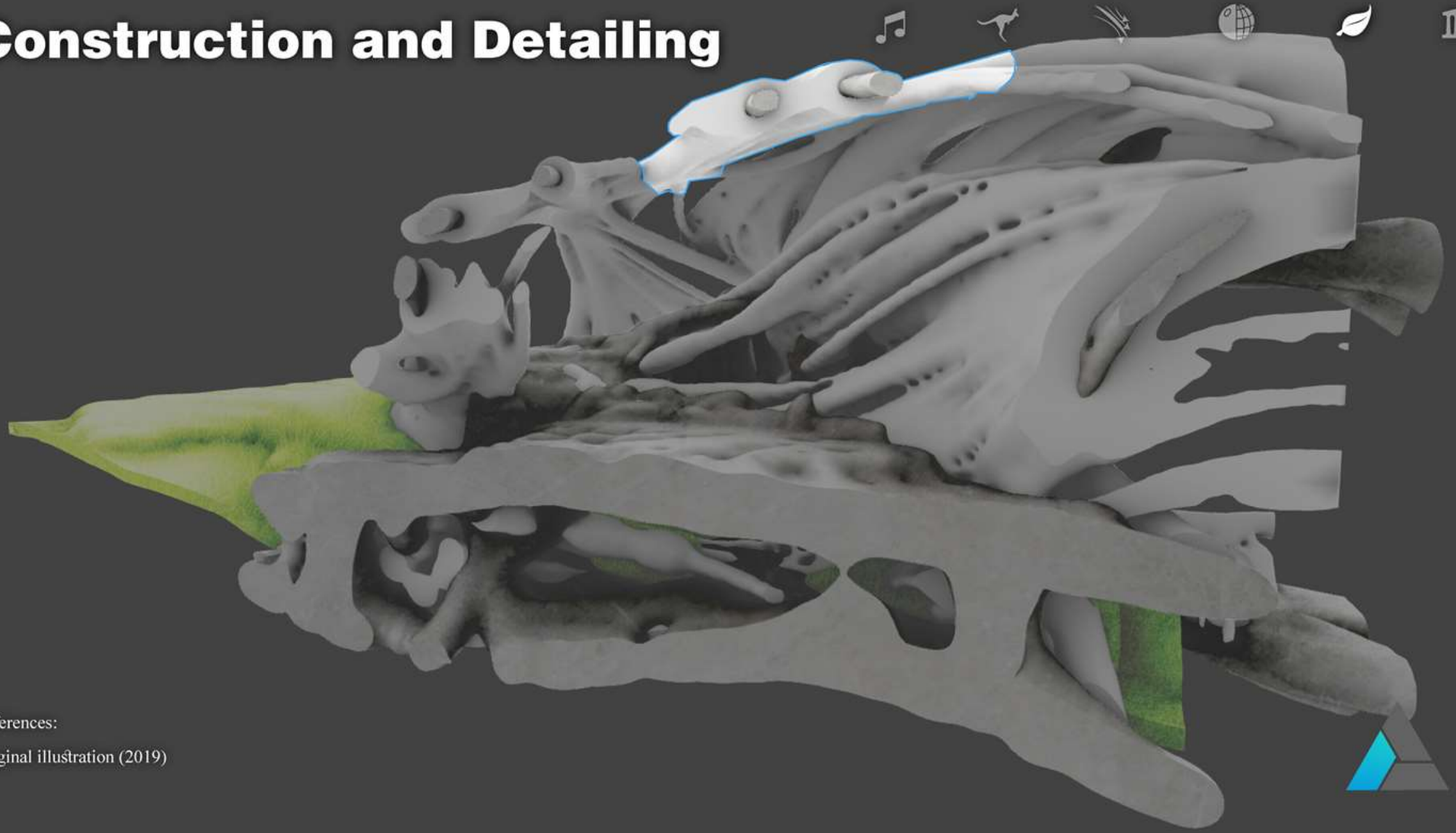

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Original illustration (2019)

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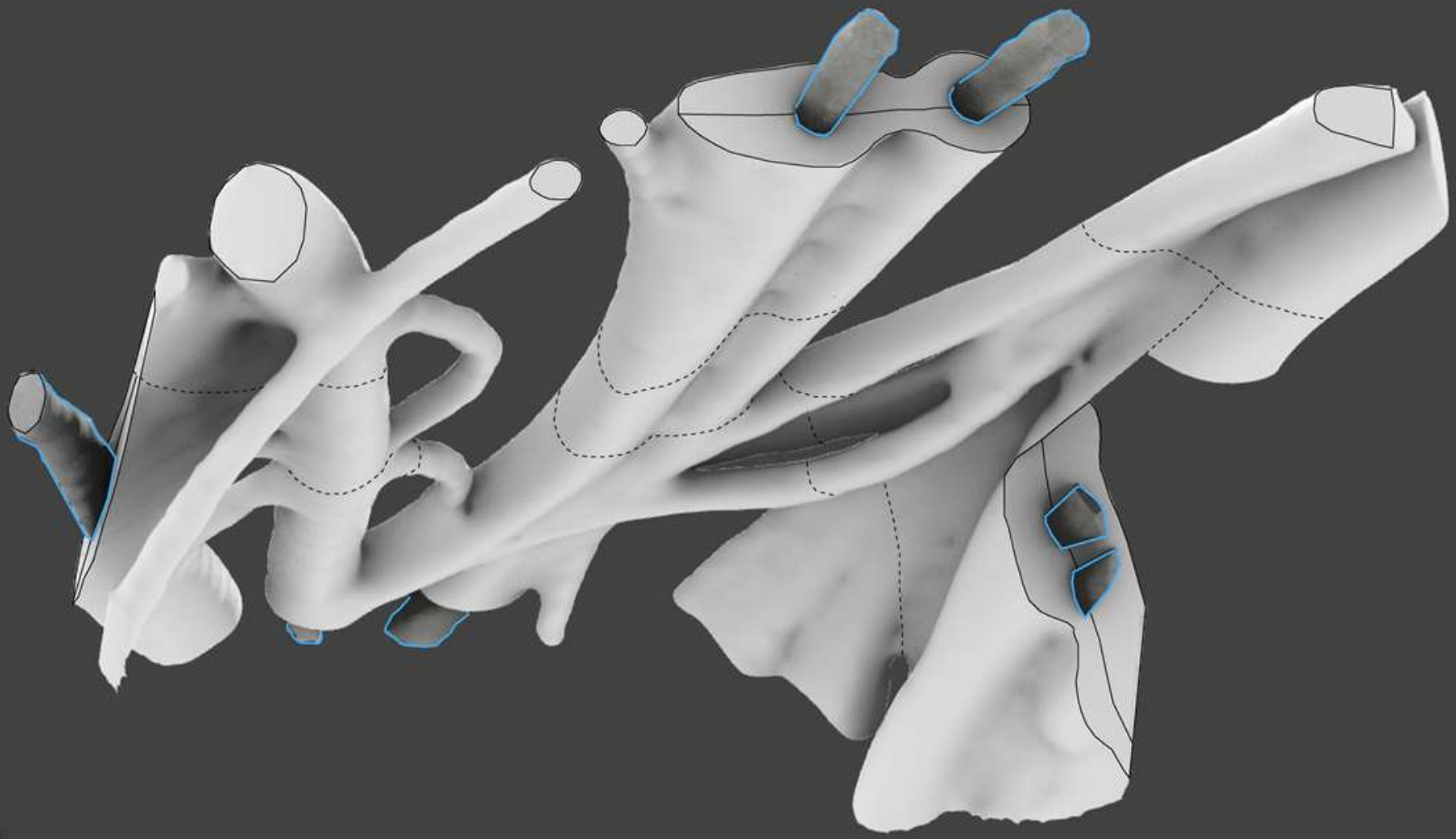
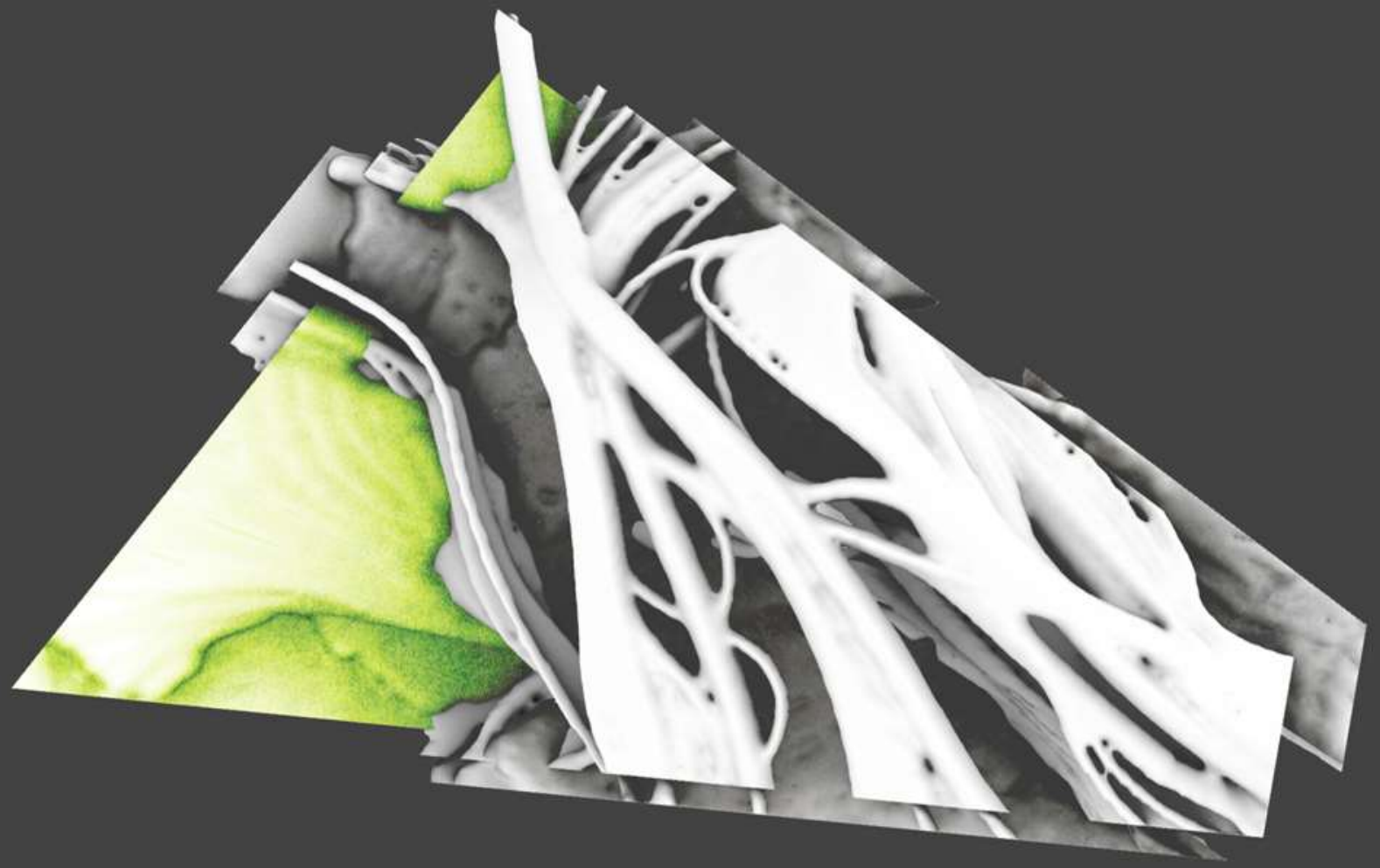


References:

Original illustration (2019)

Construction and Detailing



References:

Original illustration (2019)

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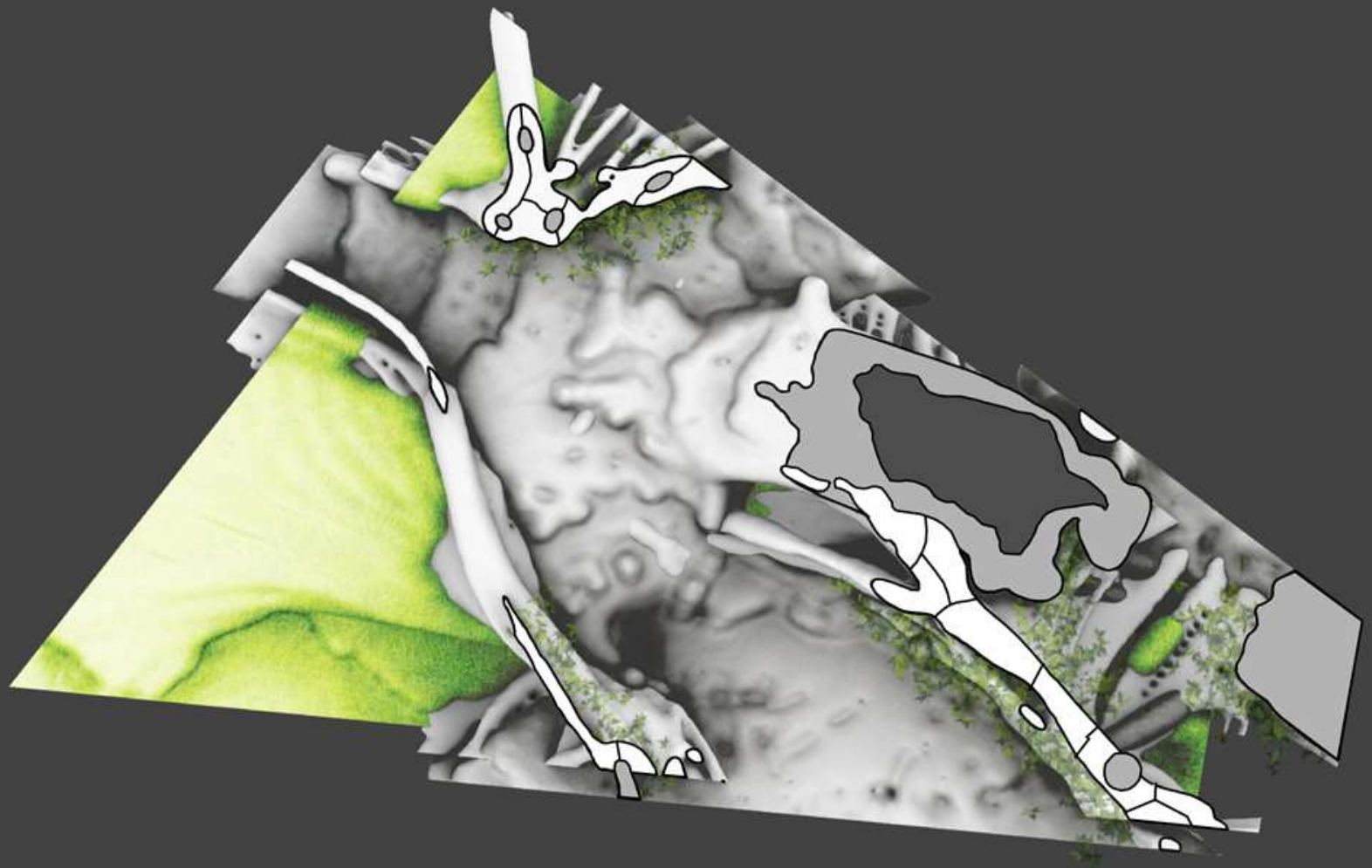

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Original illustration (2019)

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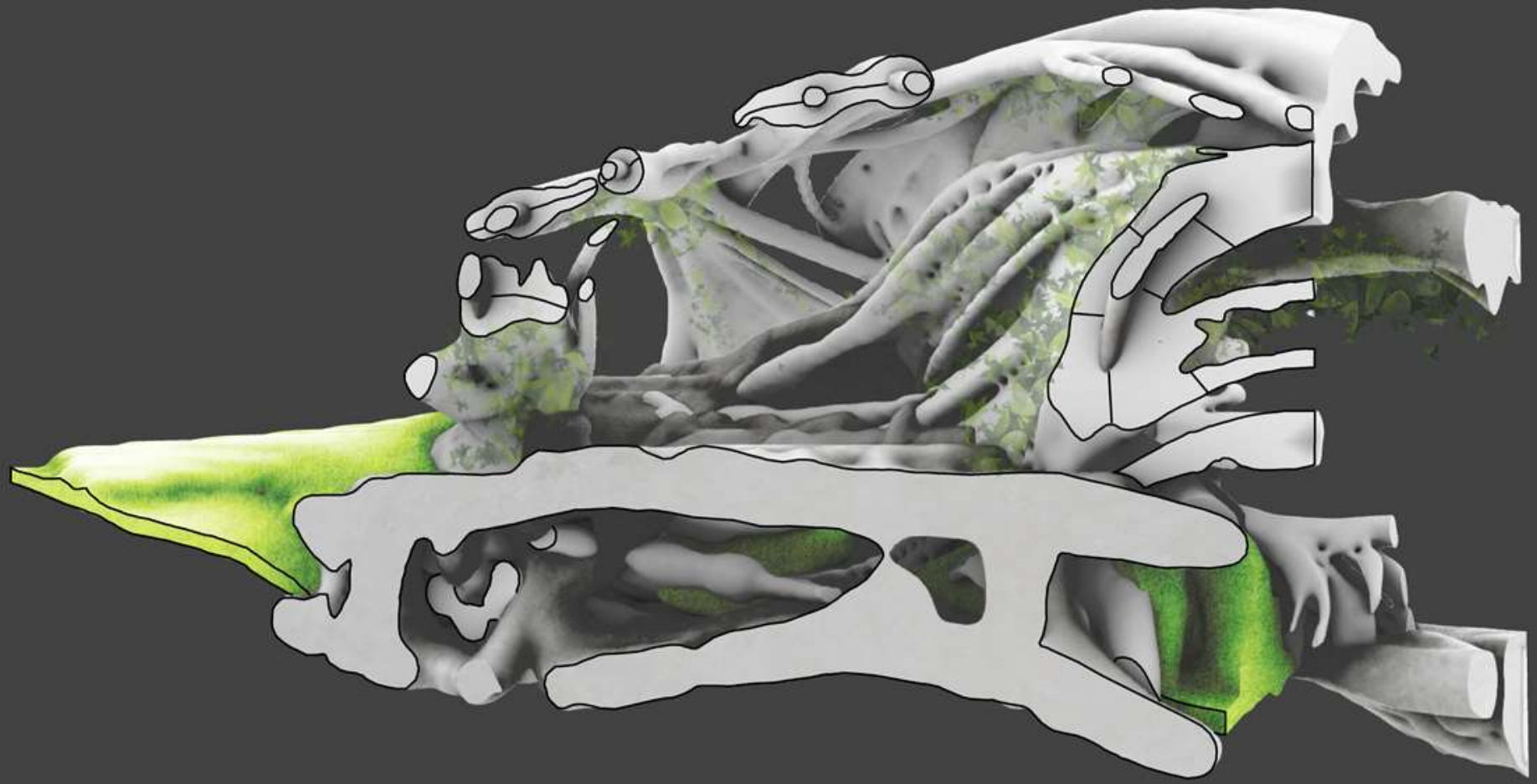
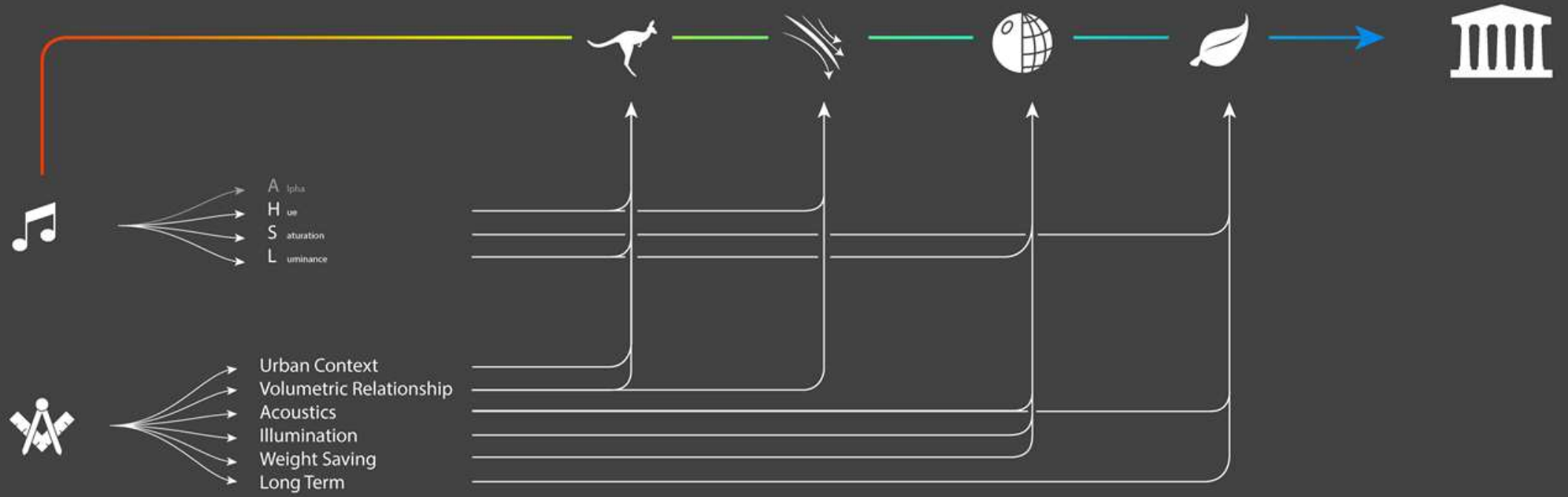


References:

Original illustration (2019)

Data Flow and Strategy

Architectural Input

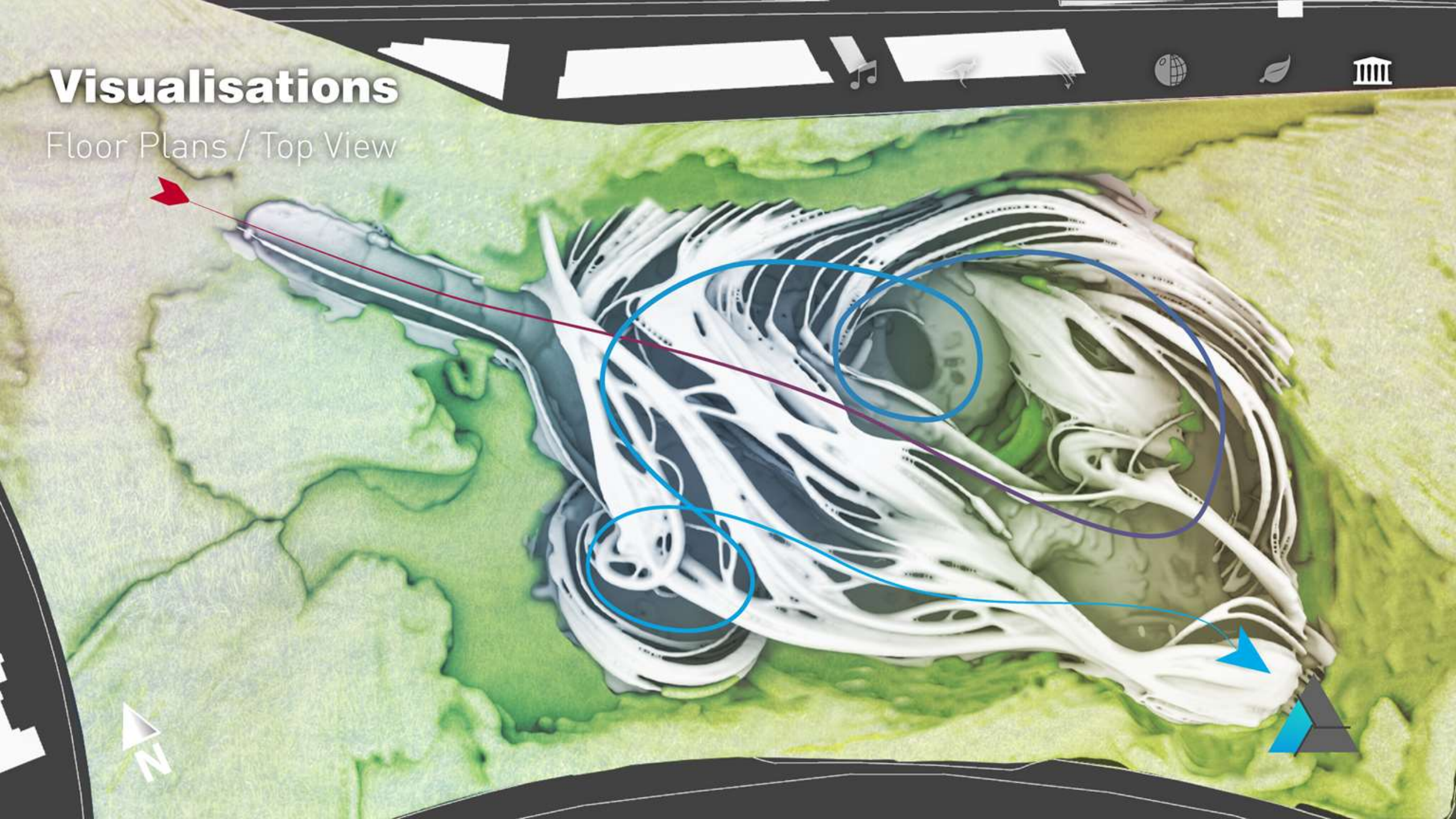


References:

Original illustration (2019)

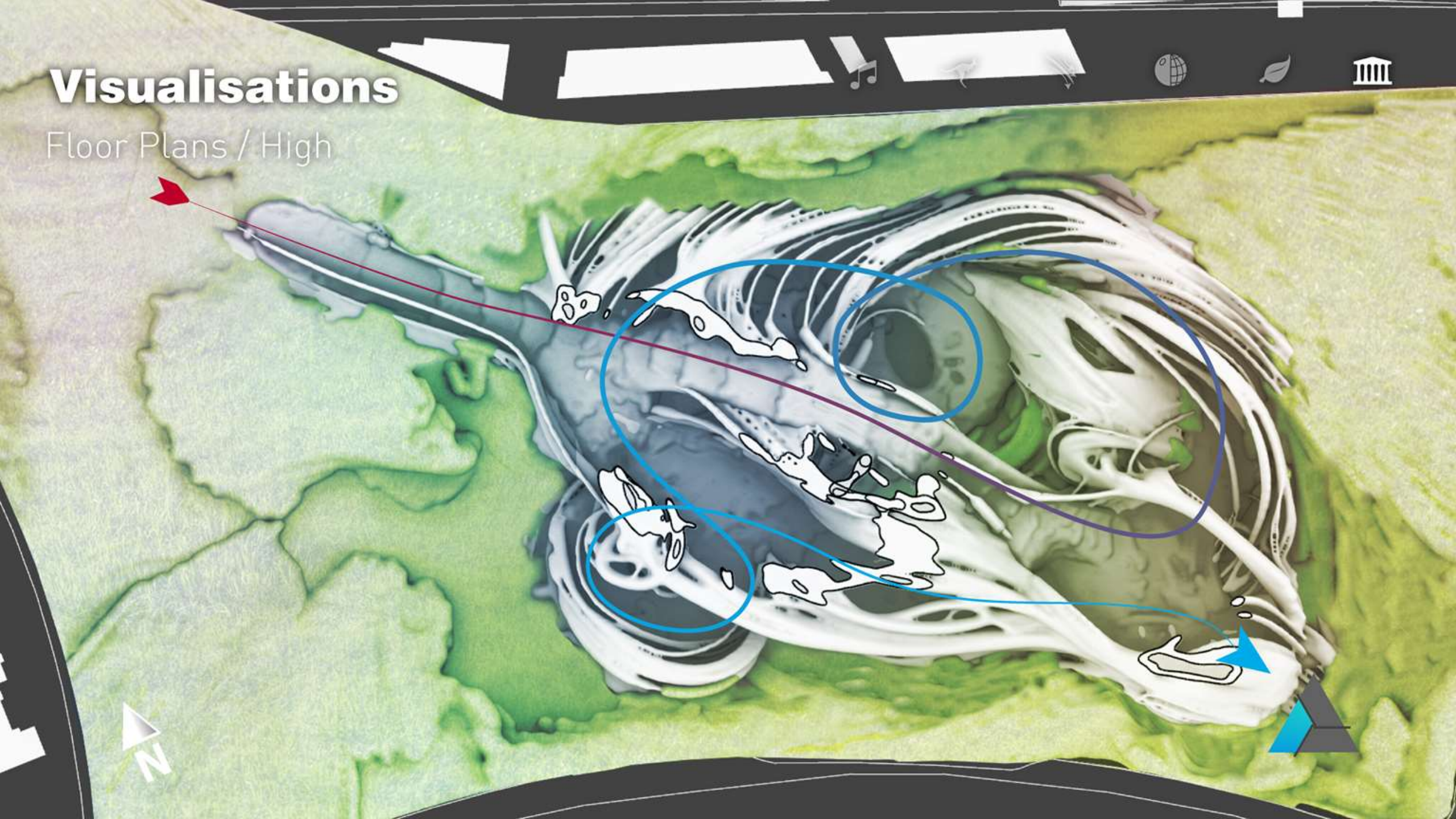
Visualisations

Floor Plans / Top View



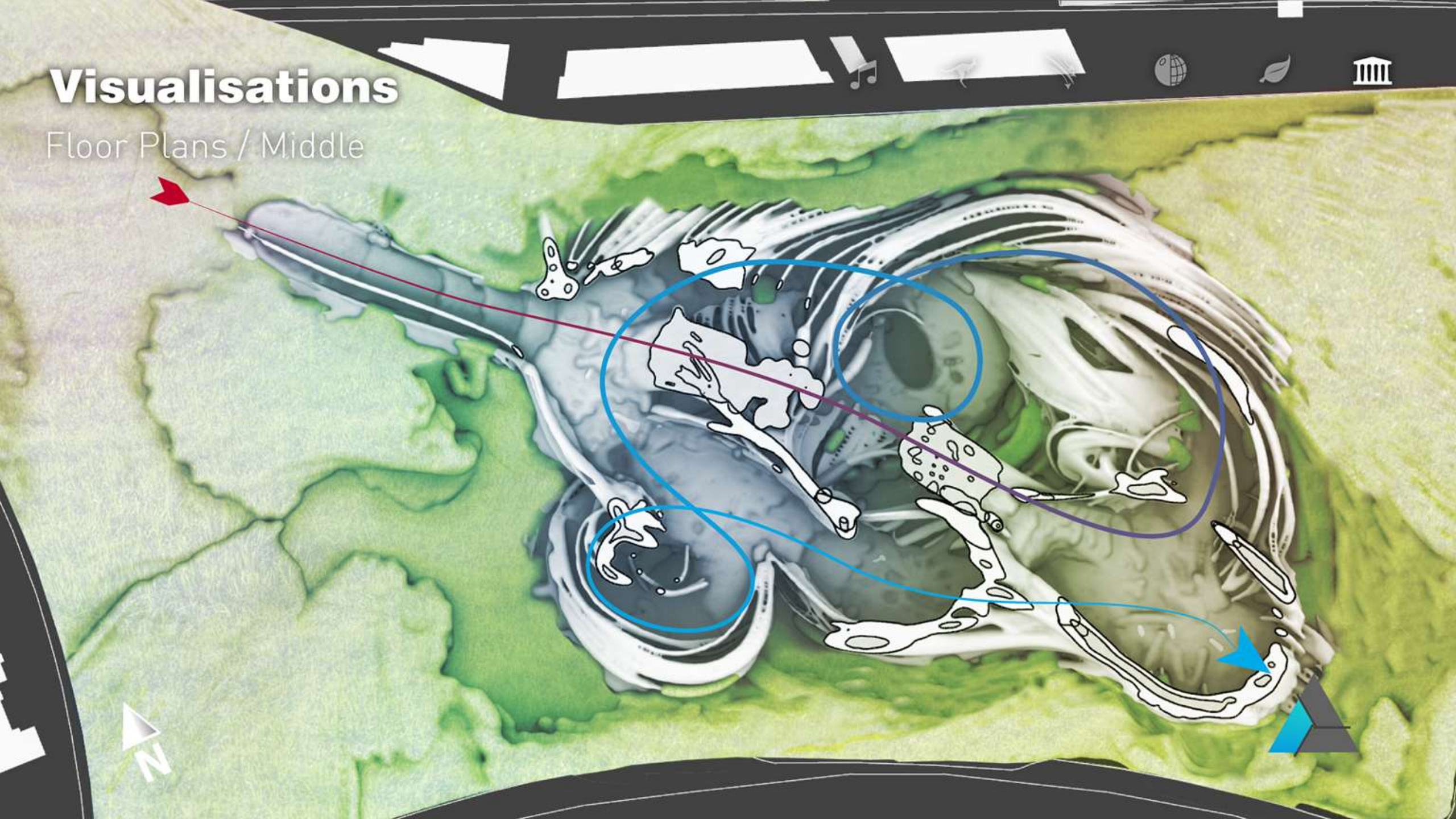
Visualisations

Floor Plans / High



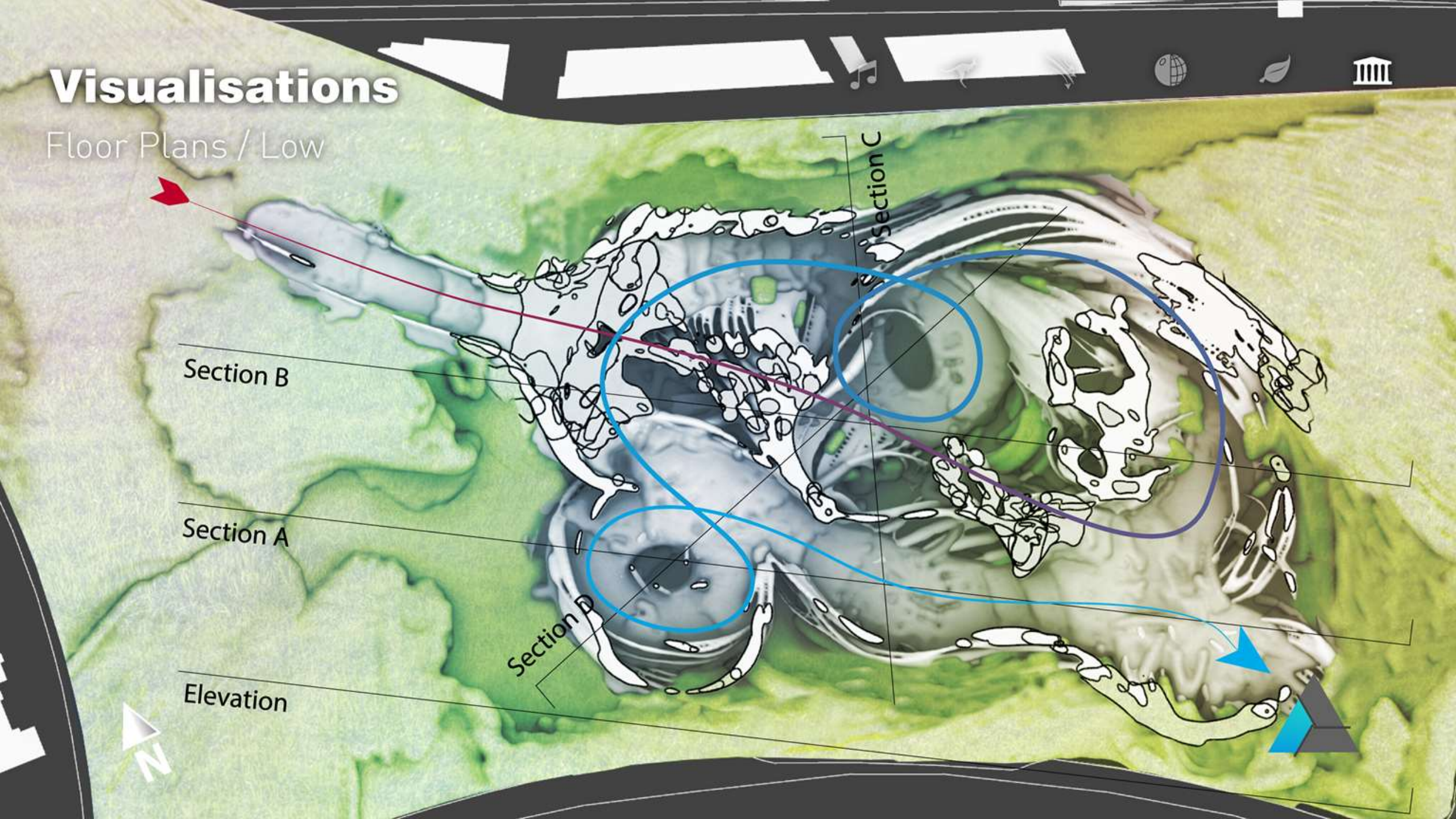
Visualisations

Floor Plans / Middle



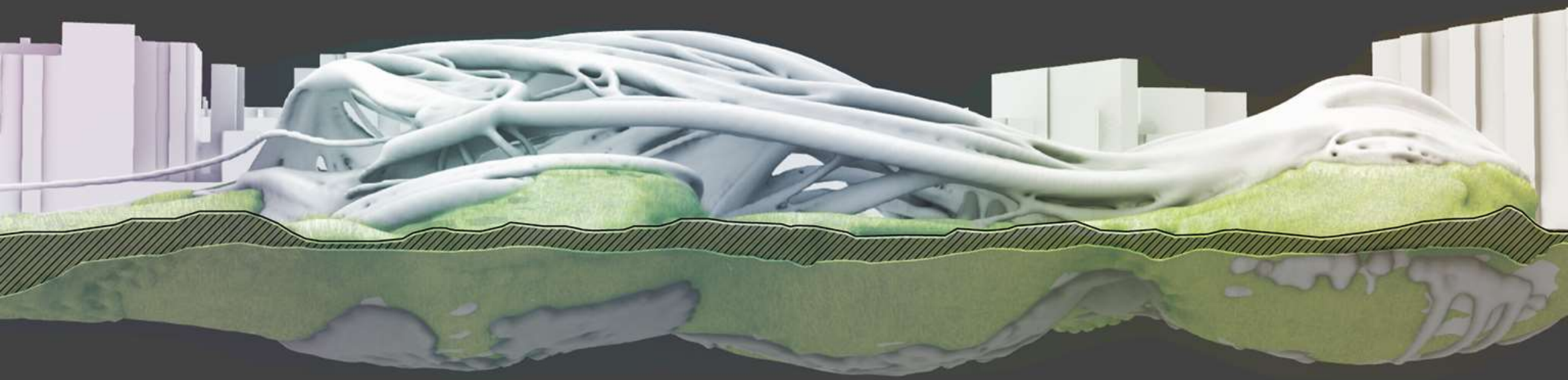
Visualisations

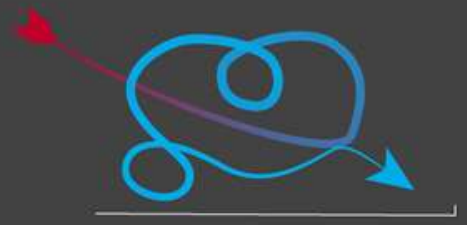
Floor Plans / Low



Visualisations

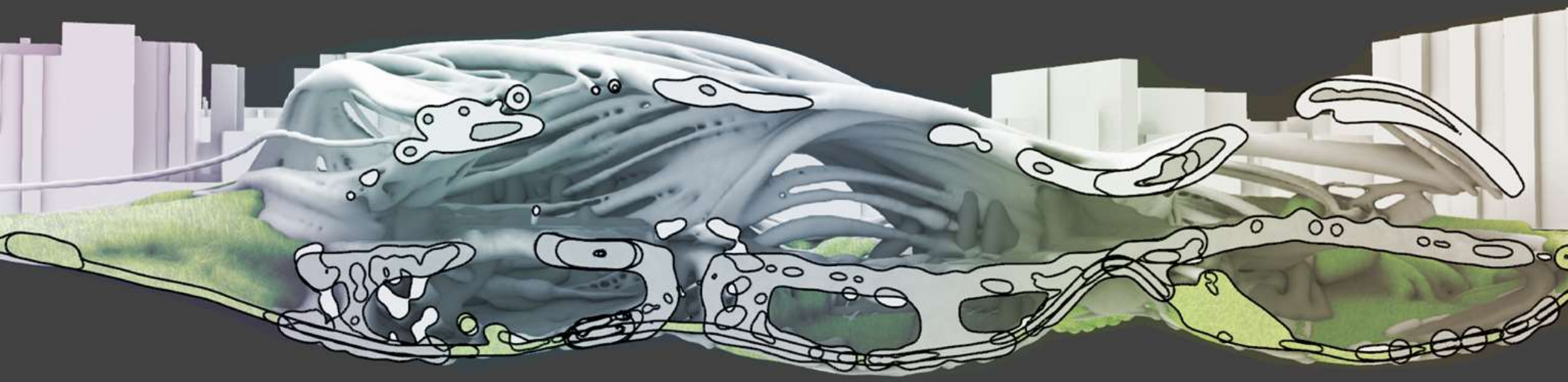
Sections - Elevation





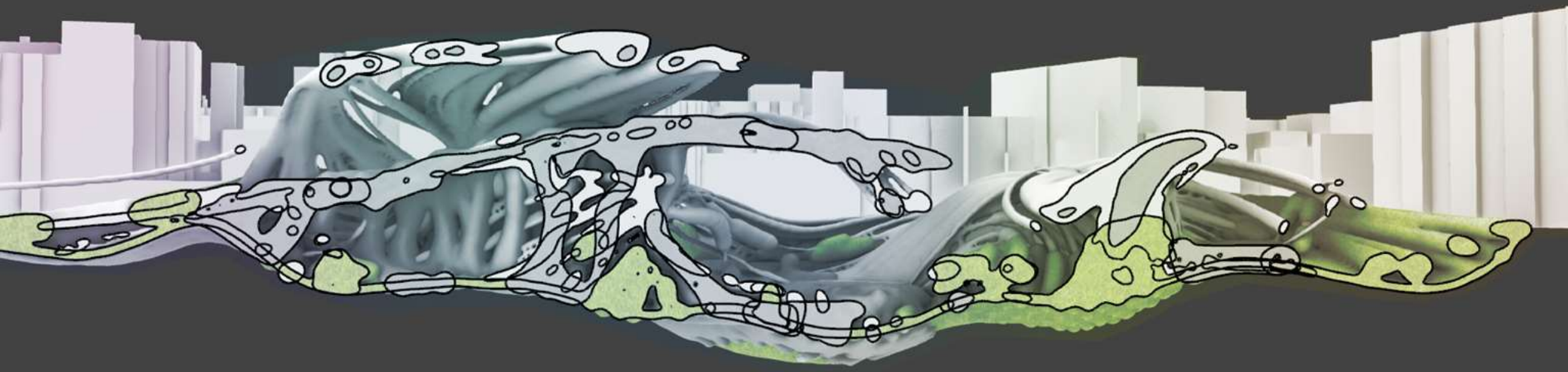
Visualisations

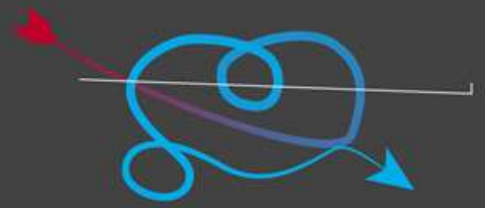
Sections - Section A



Visualisations

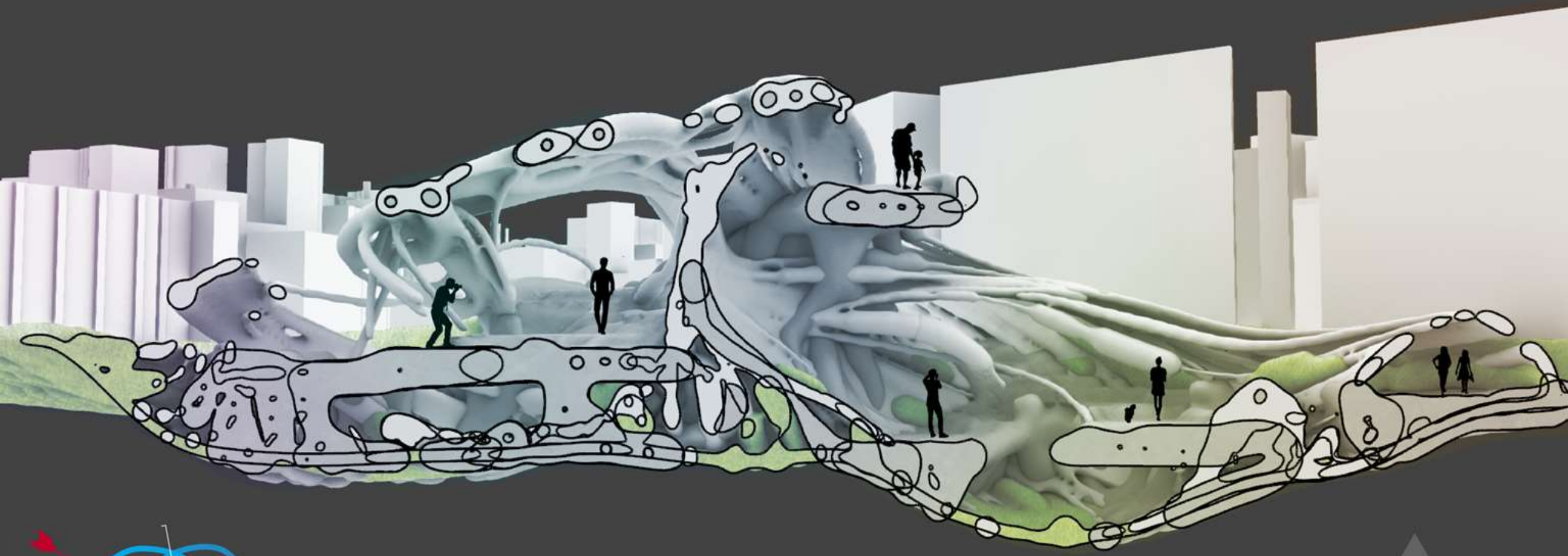
Sections - Section B





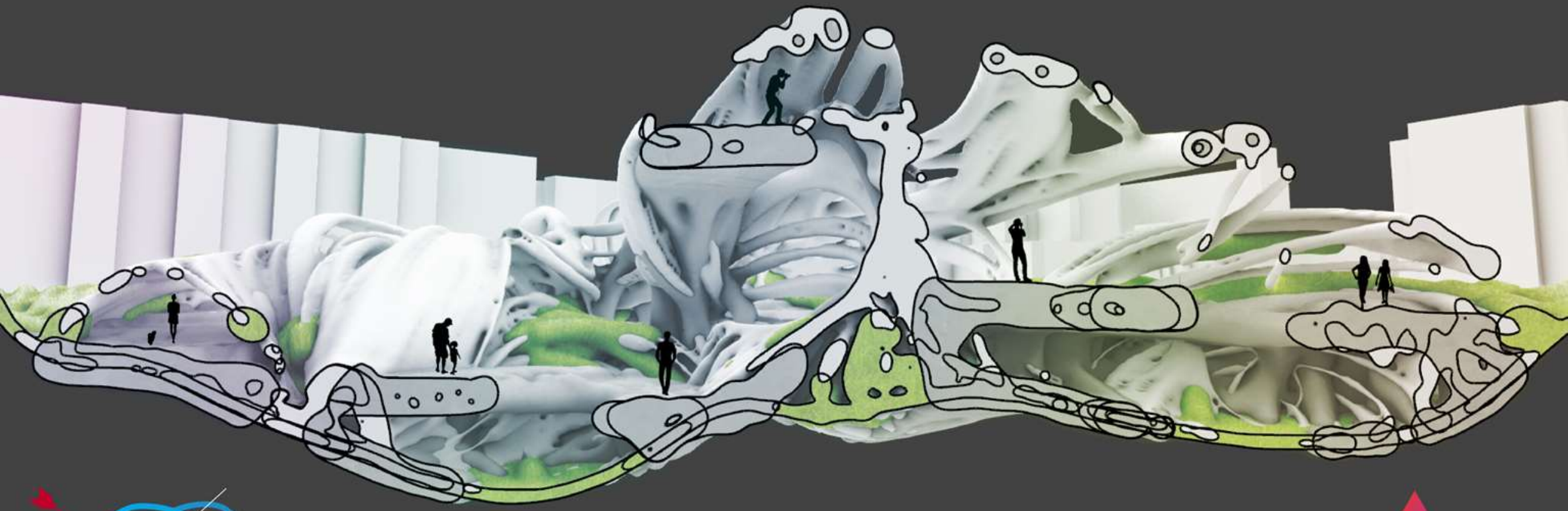
Visualisations

Sections / Section C



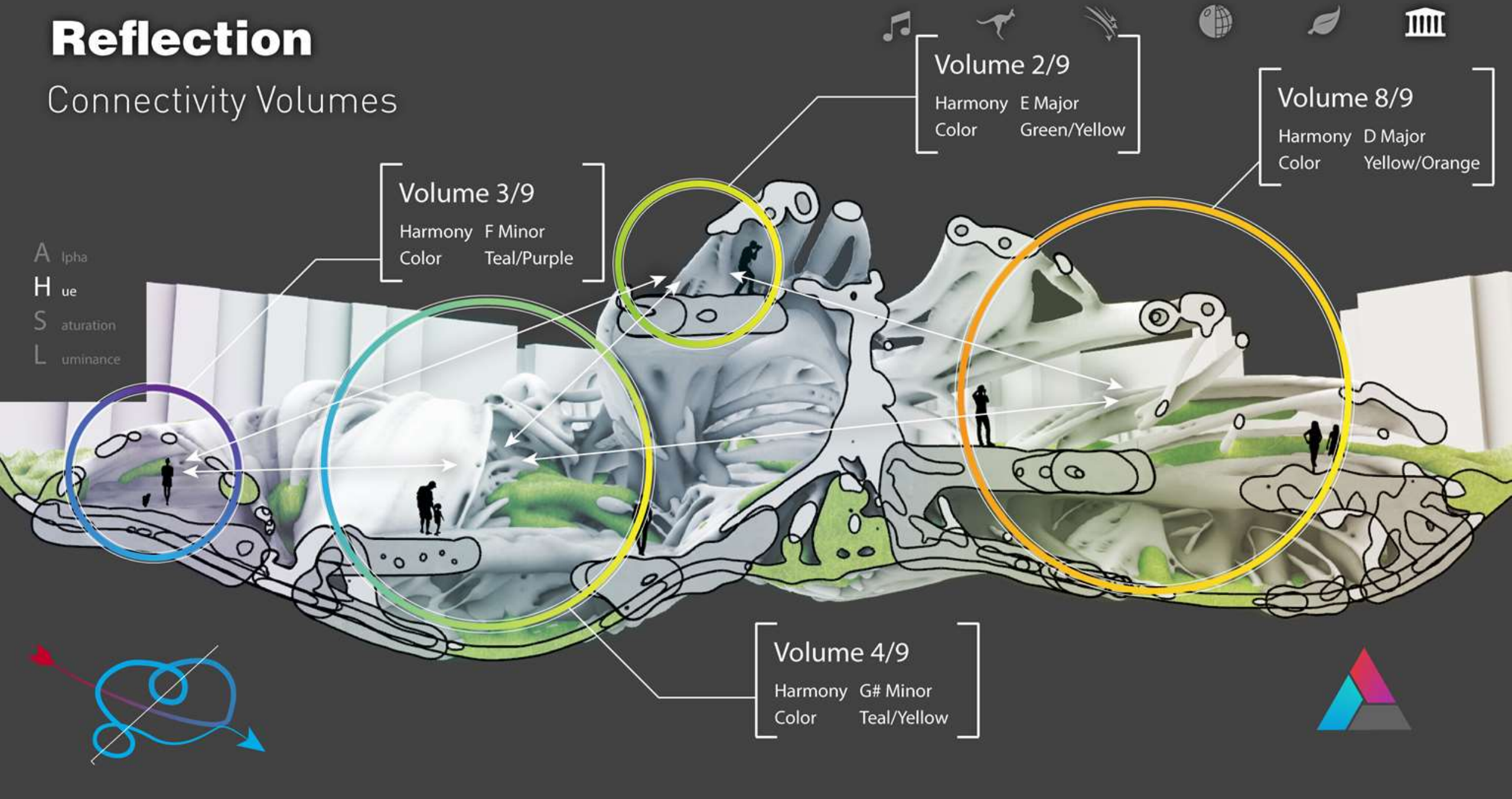
Visualisations

Sections / Section D



Reflection

Connectivity Volumes



Reflection

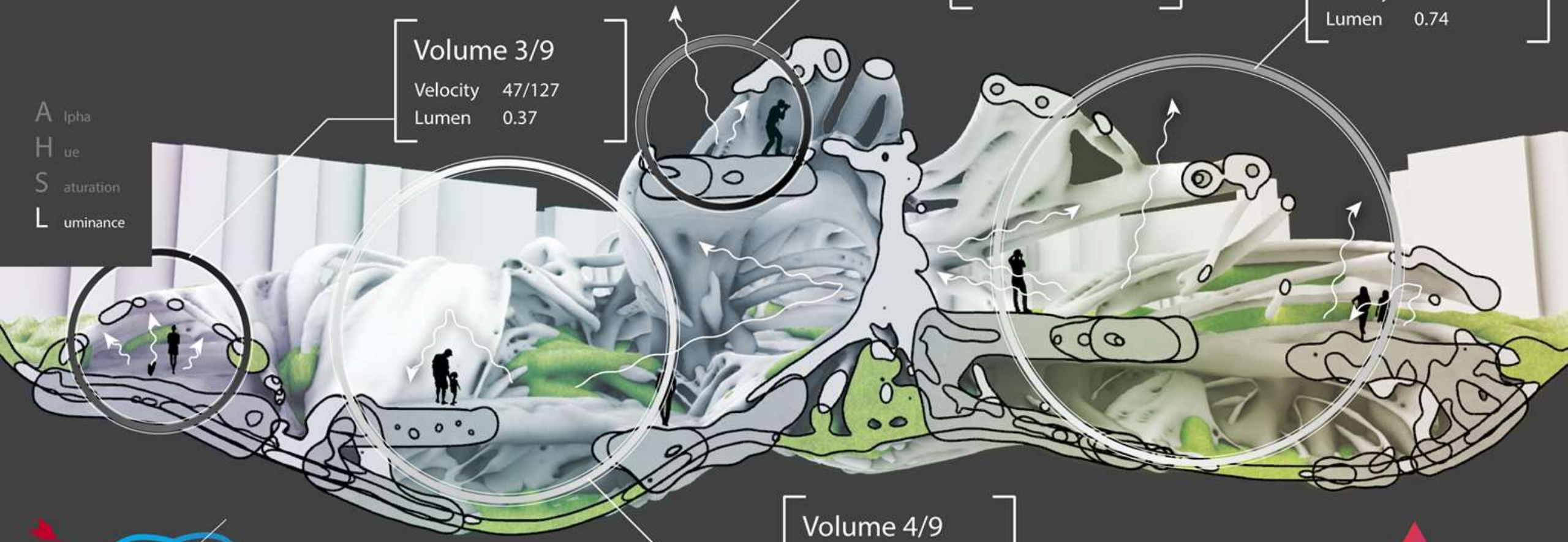
Acoustic Behaviour/Volume

Volume 2/9
Velocity 34/127
Lumen 0.27

Volume 8/9
Velocity 94/127
Lumen 0.74

Volume 3/9
Velocity 47/127
Lumen 0.37

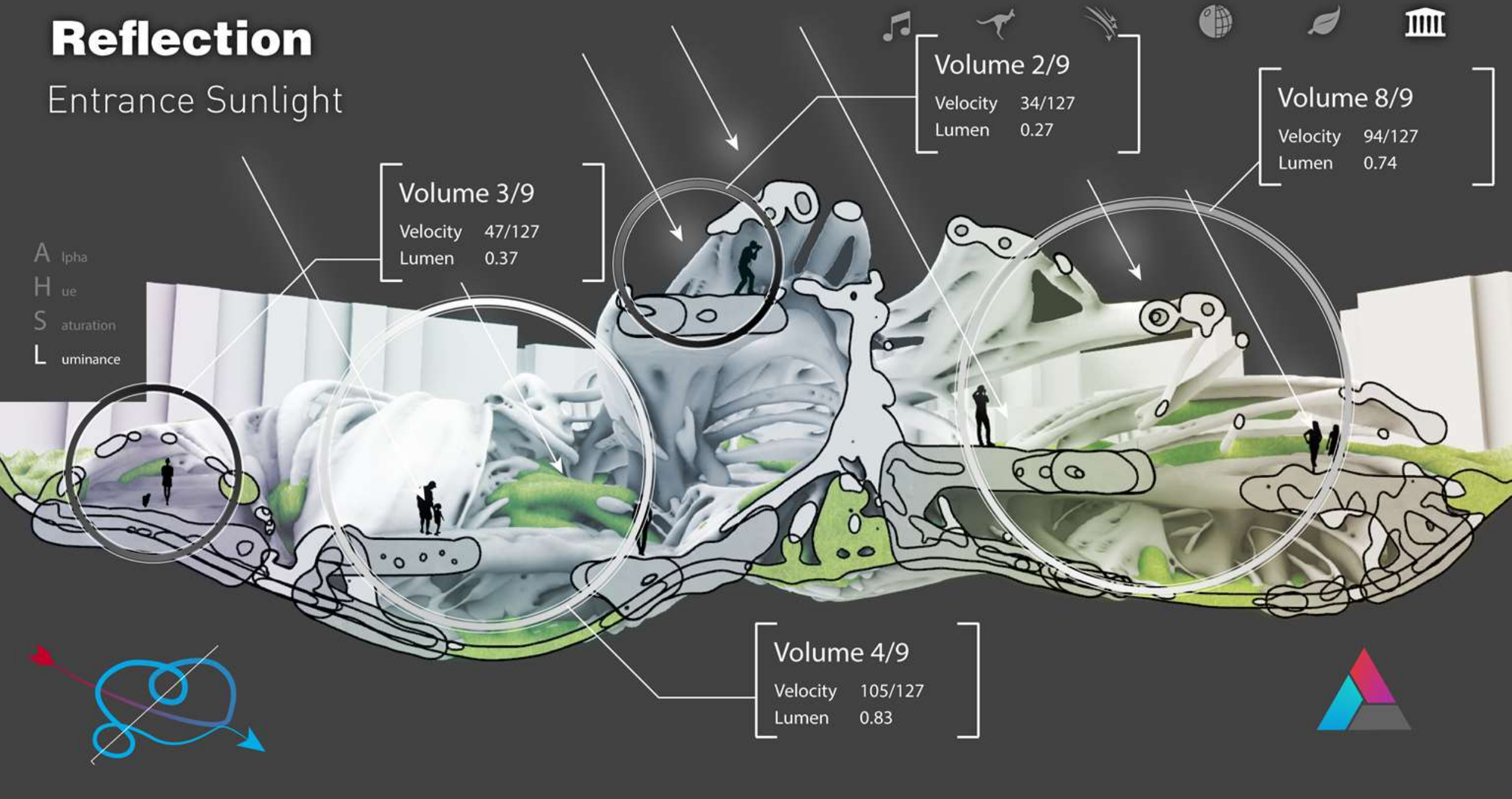
A lpha
H ue
S aturation
L uminance



Volume 4/9
Velocity 105/127
Lumen 0.83

Reflection

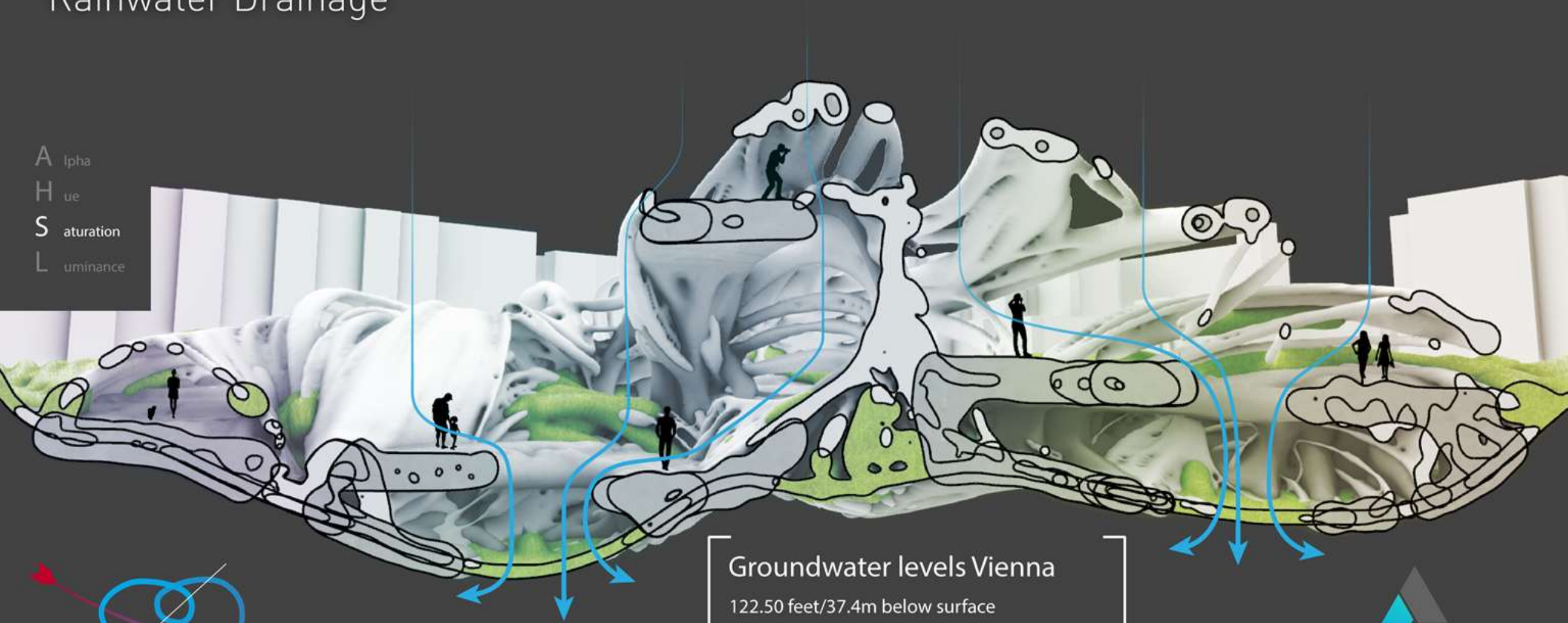
Entrance Sunlight



Reflection

Rainwater Drainage

A lpha
H ue
S aturation
L uminance



Groundwater levels Vienna

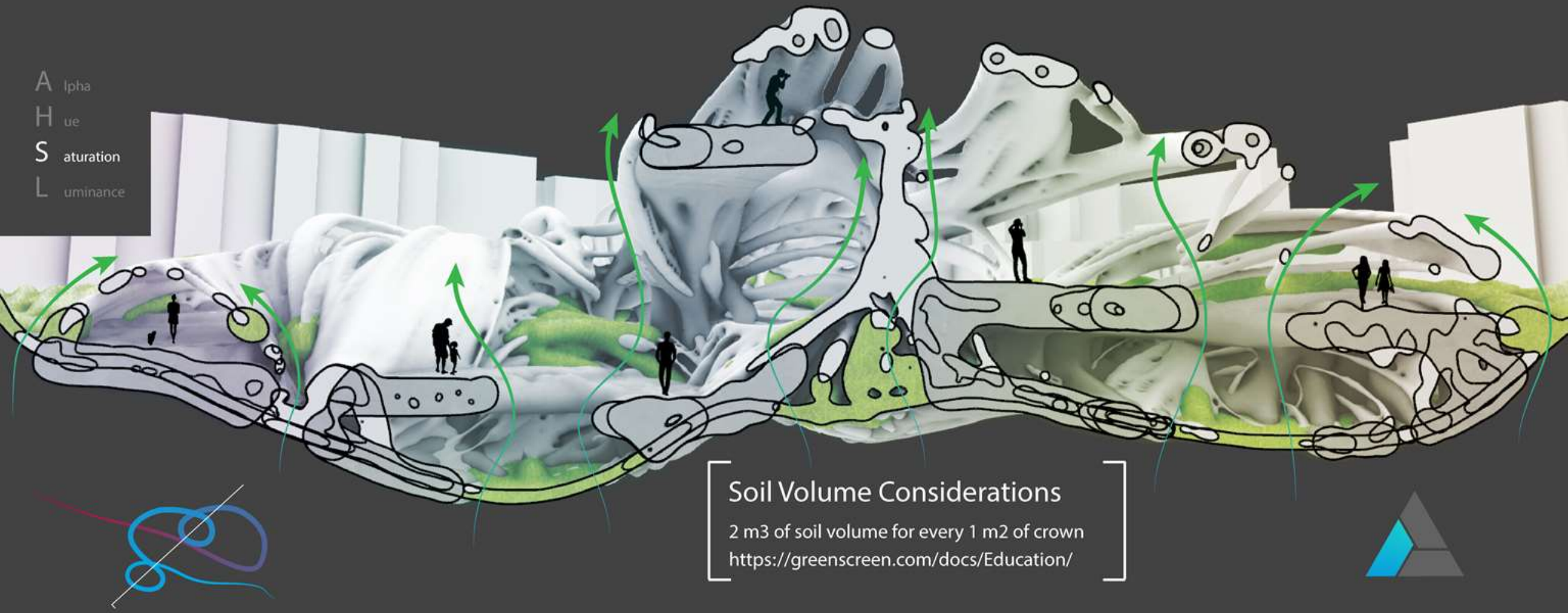
122.50 feet/37.4m below surface

https://waterdata.usgs.gov/nwis/uv/

Reflection

Ivy Growth

A lpha
H ue
S aturation
L uminance



Soil Volume Considerations

2 m3 of soil volume for every 1 m2 of crown
https://greenscreen.com/docs/Education/

Reflection

Vegetation Growth

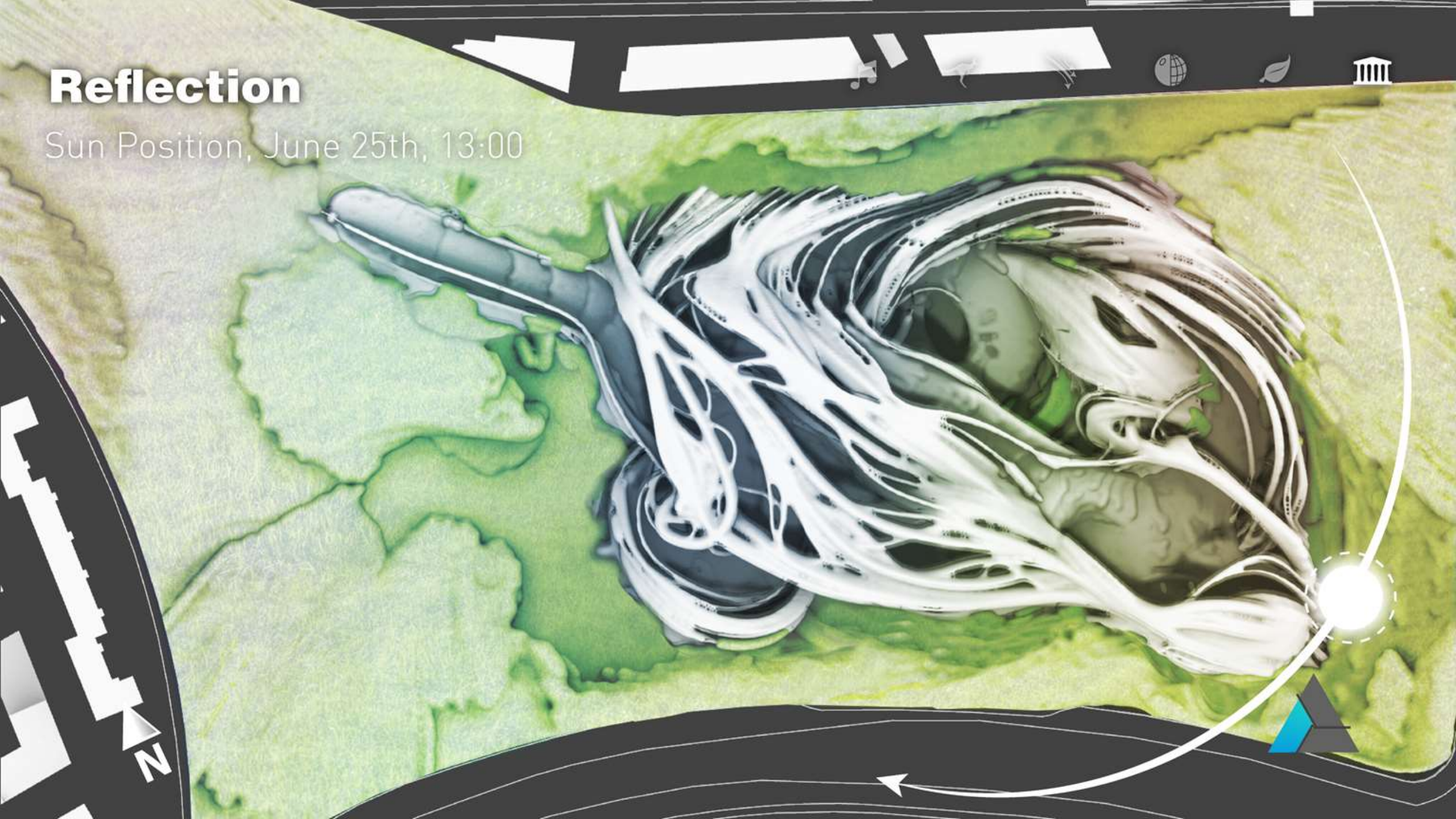
A lpha
H ue
S aturation
L uminance

Reflection

Impression Entrance

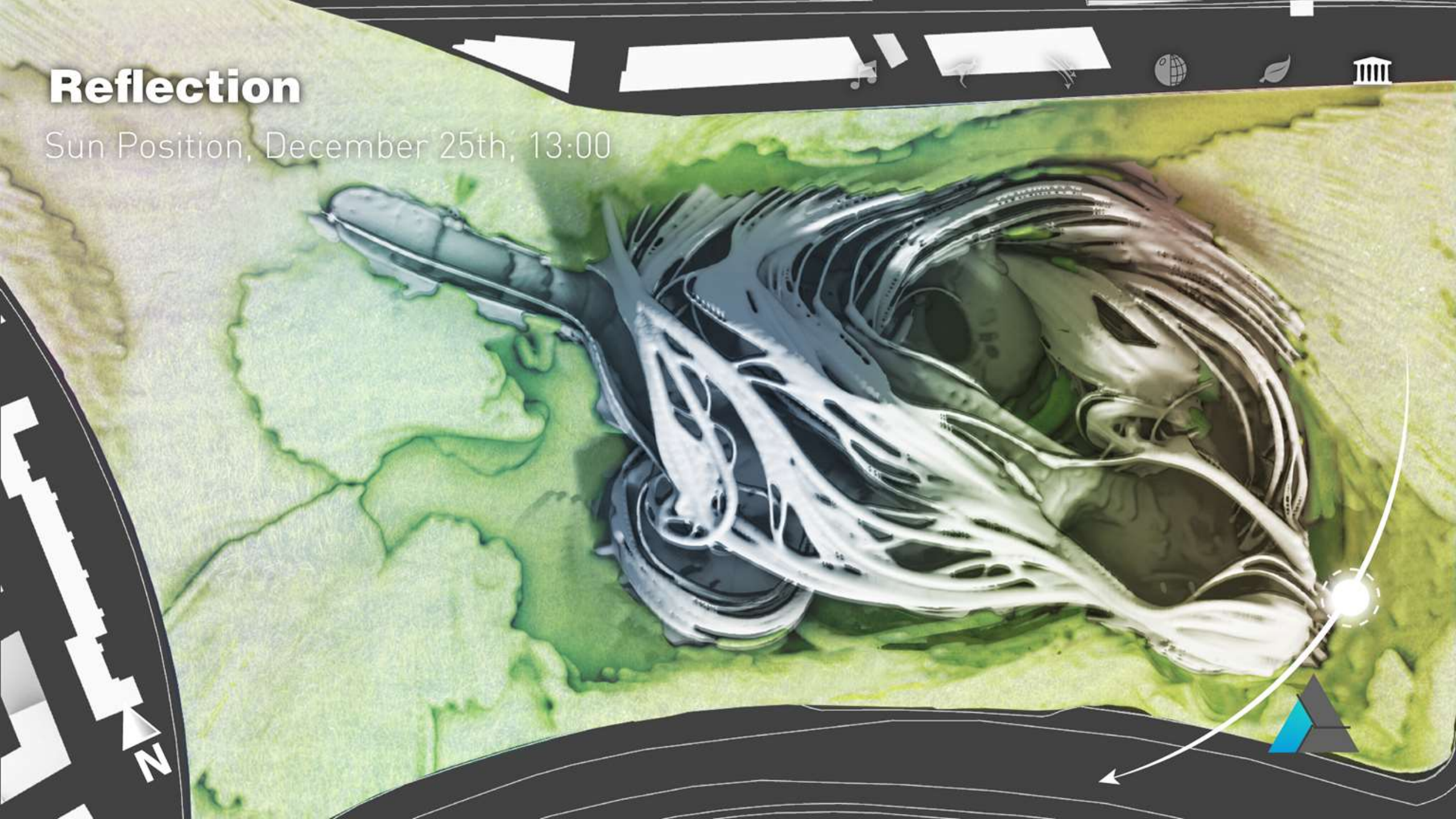
Reflection

Sun Position, June 25th, 13:00



Reflection

Sun Position, December 25th, 13:00

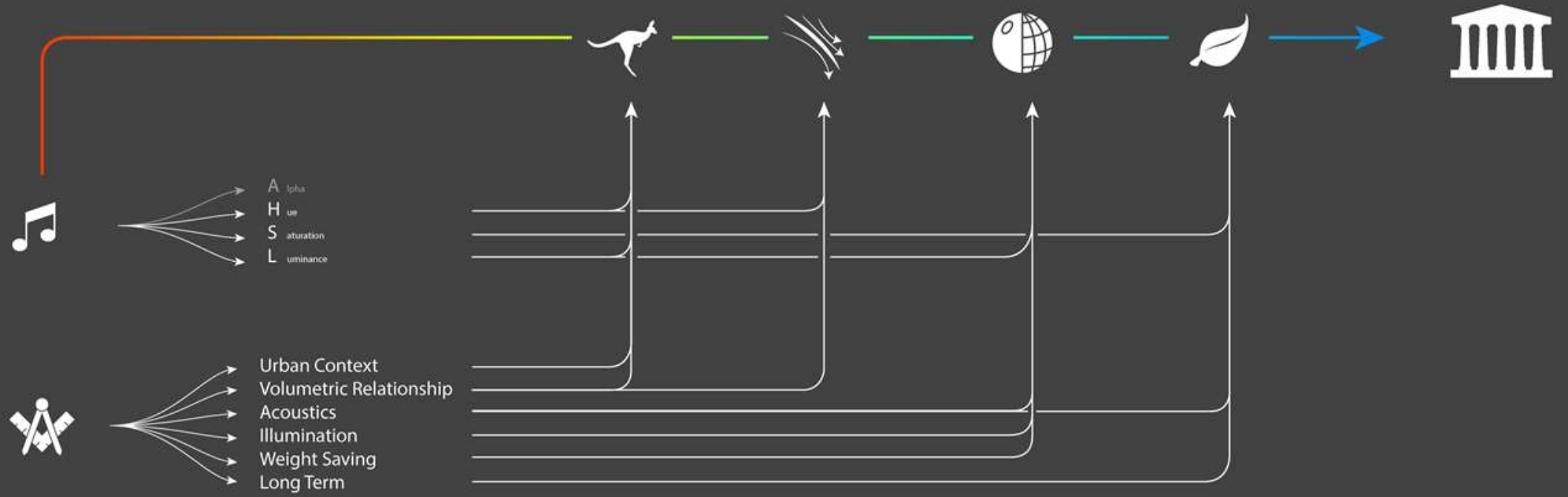



Reflection
Impression, June 25th, 13:00


Reflection
Impression December 25th, 13:00

Conclusion

Parameteric Model

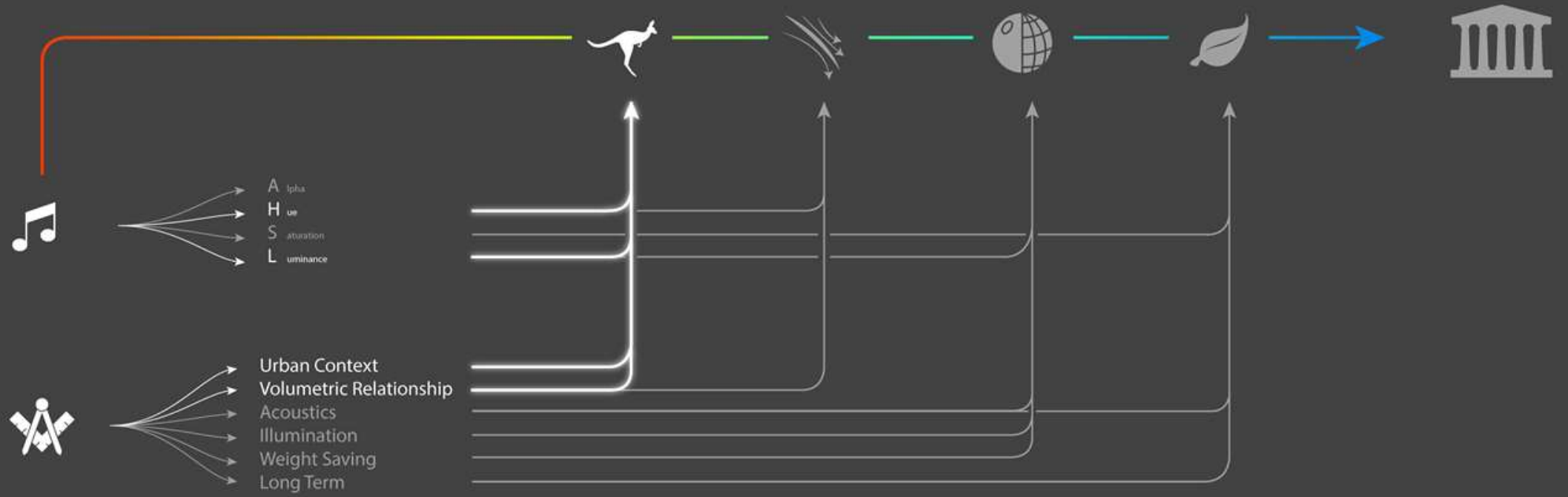


References:

Original Illustration (2019)

Conclusion

Parametric Model - Configuration

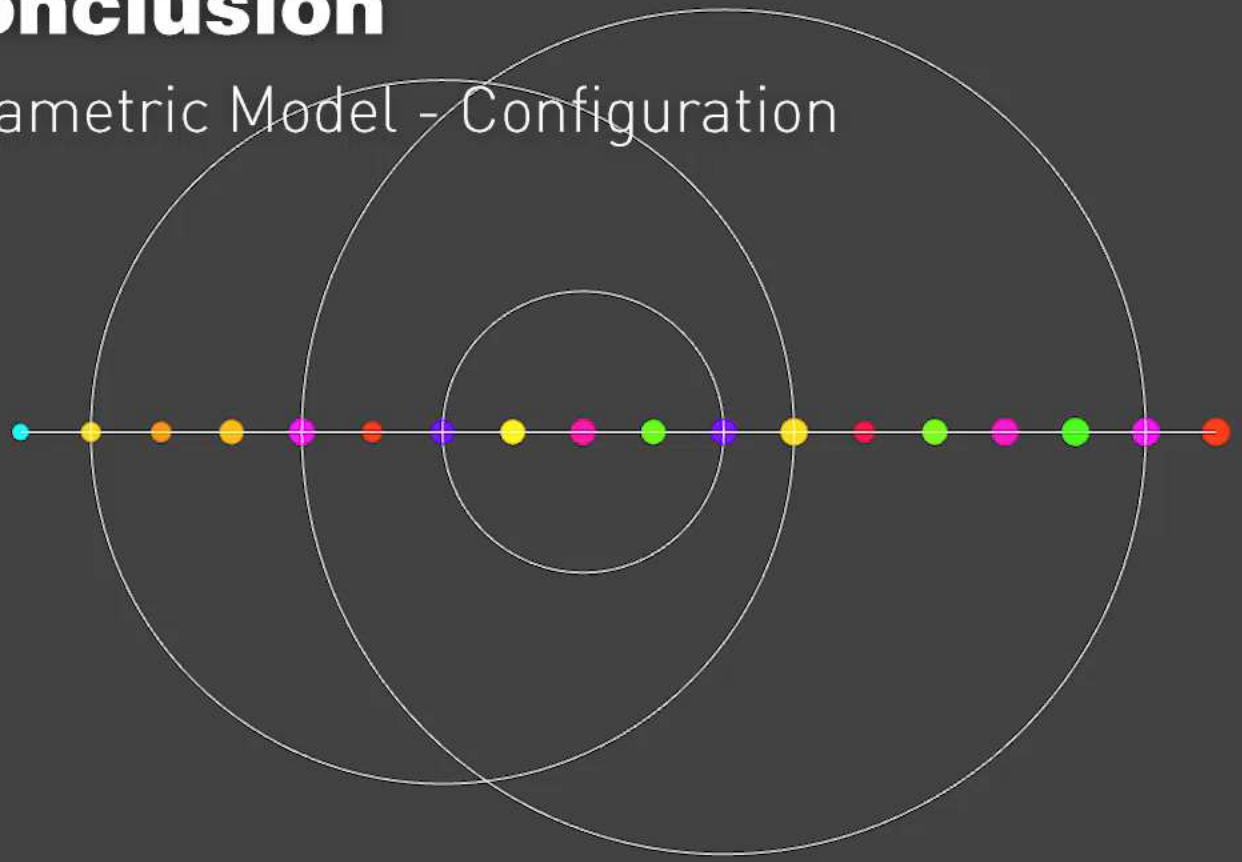


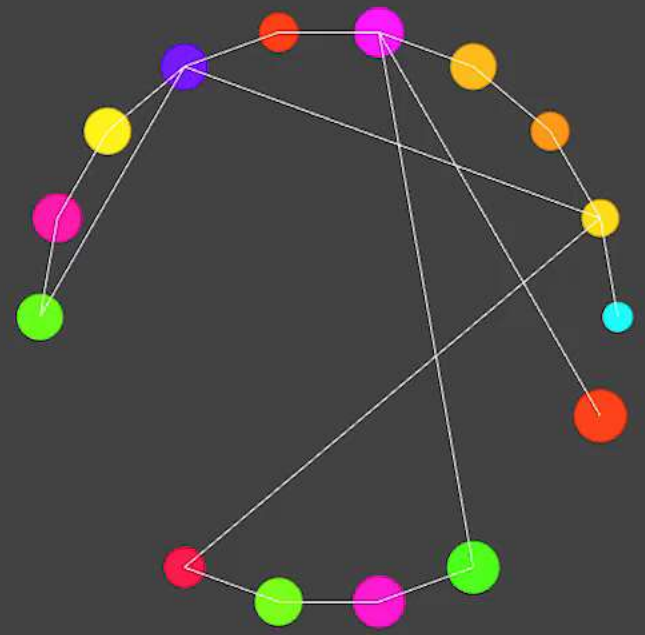
References:

Original Illustration (2019)

Conclusion

Parametric Model - Configuration





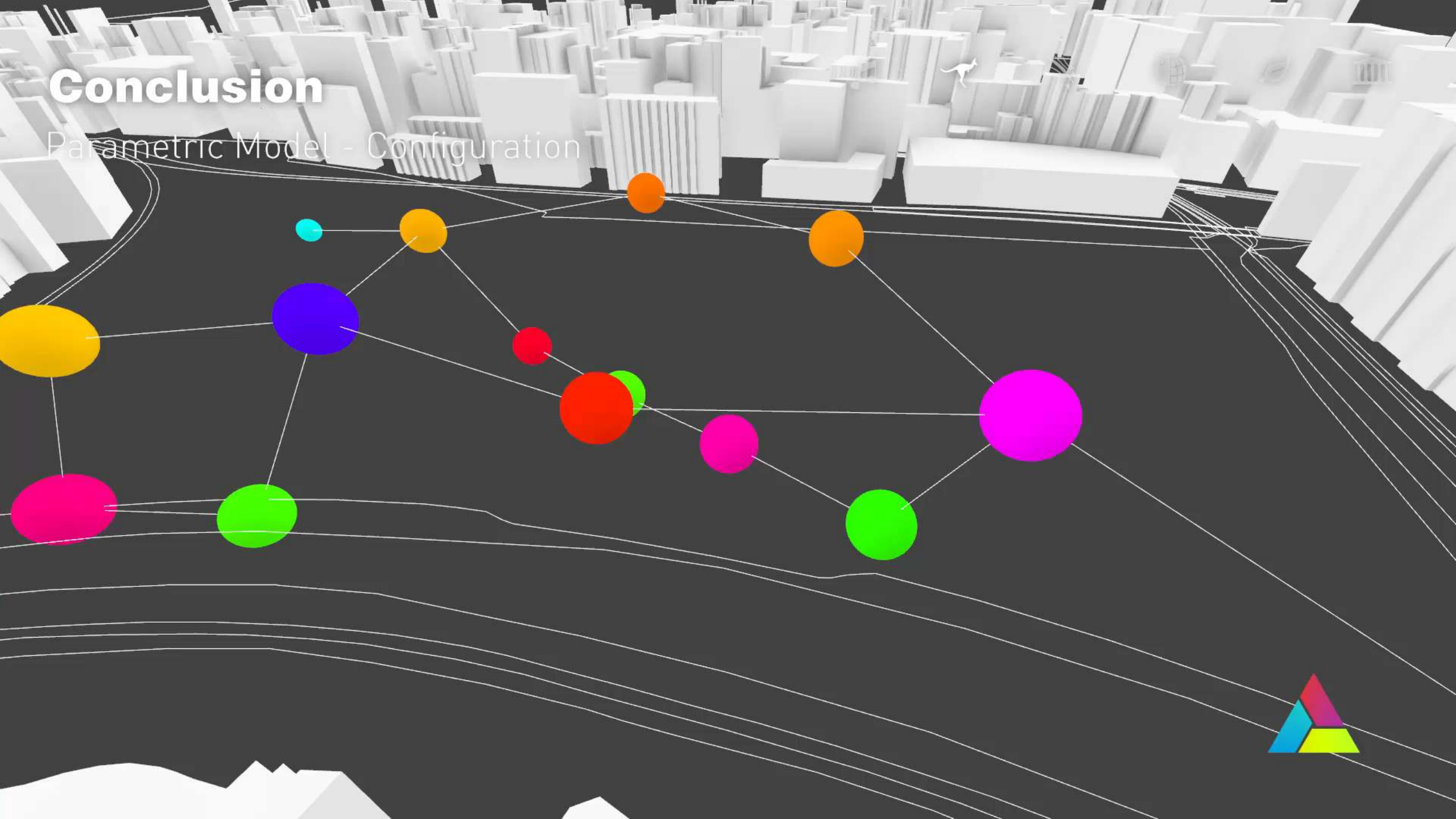
NUMBER OF SEGMENTS: 18

dHSL TOLERANCE: 2.275%

NUMBER OF COINCEDENTAL: 6

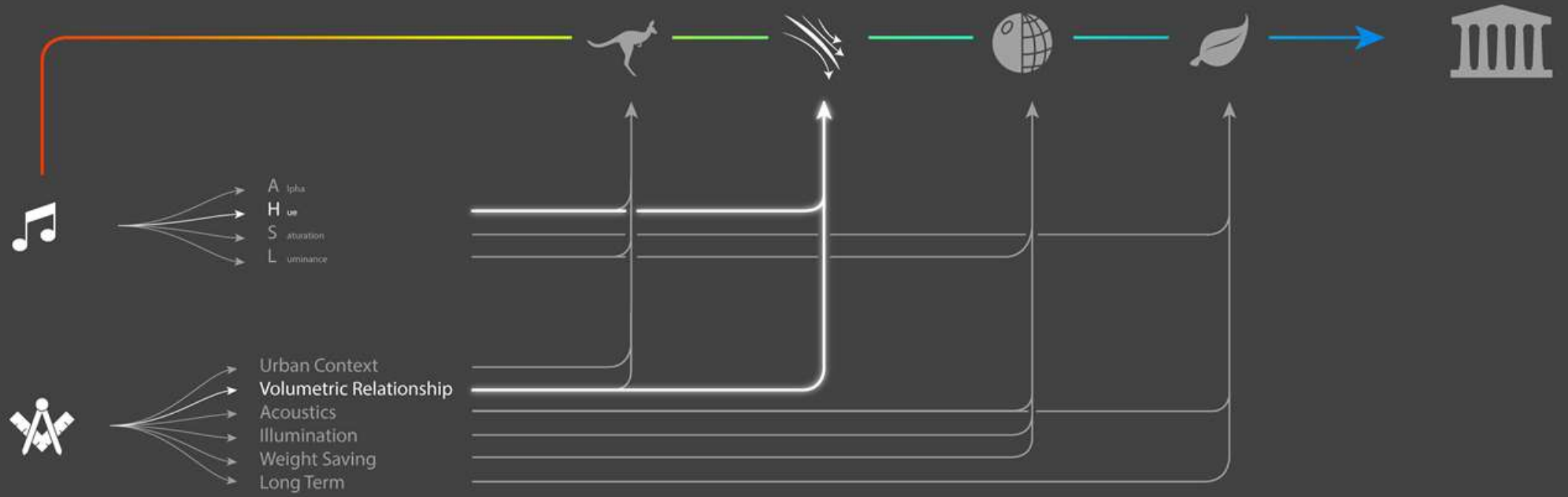
Conclusion

Parametric Model - Configuration



Conclusion

Parametric Model - Vector Field

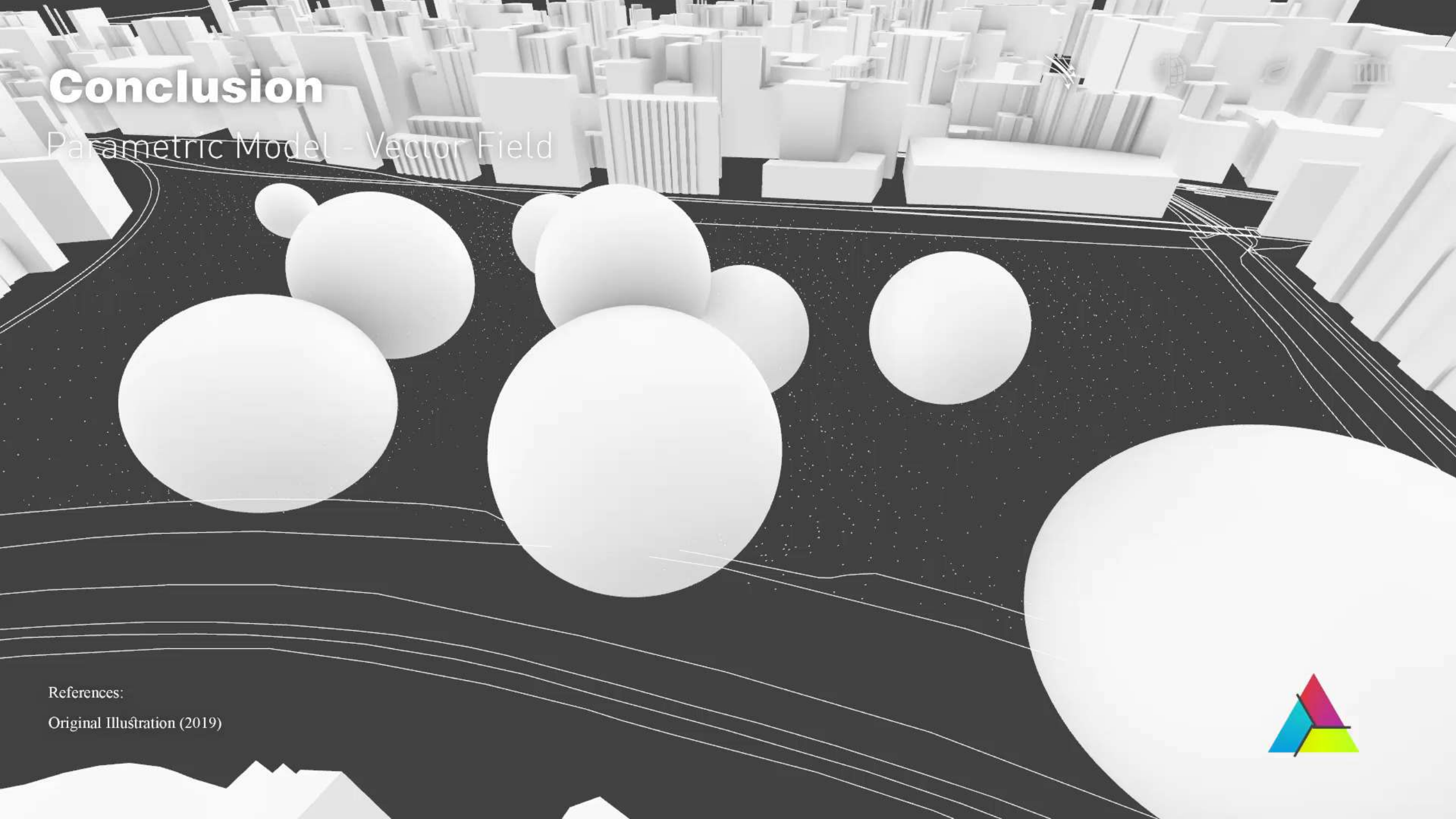


References:

Original Illustration (2019)

Conclusion

Parametric Model - Vector Field

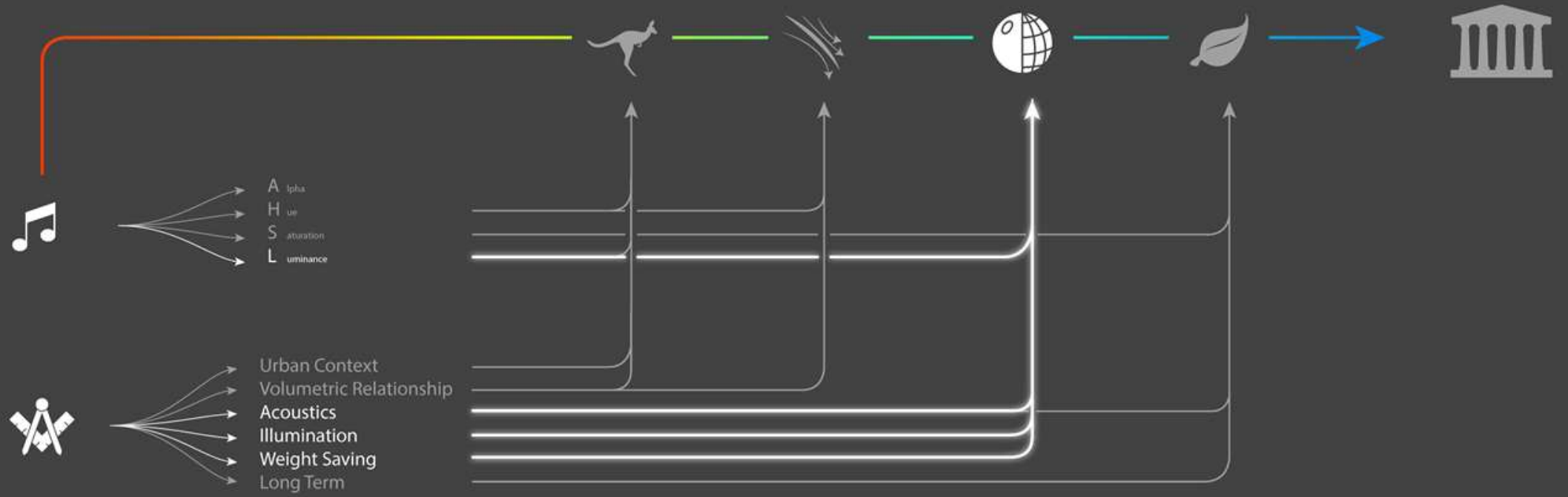


References:

Original Illustration (2019)

Conclusion

Parametric Model - Materialization

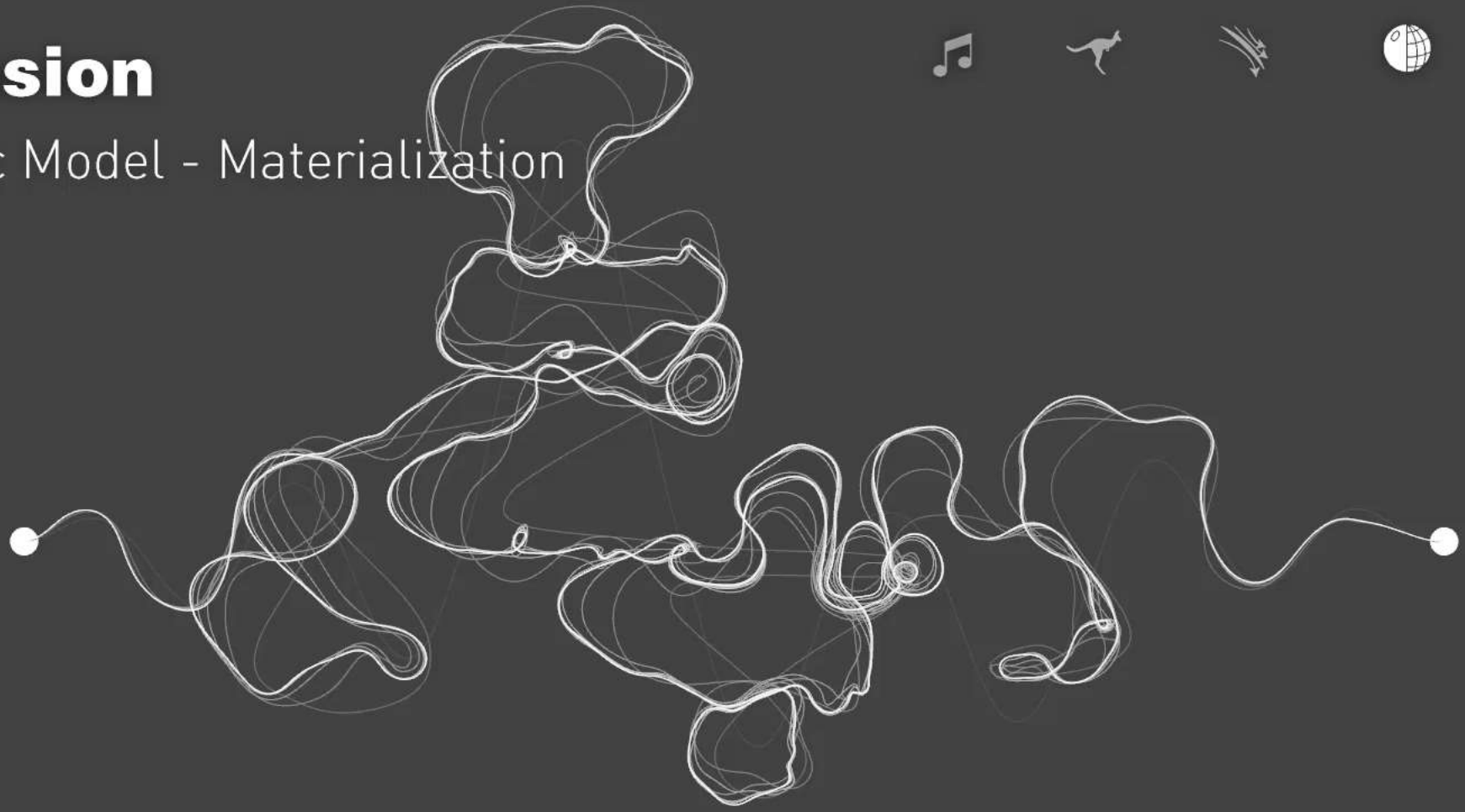


References:

Original Illustration (2019)

Conclusion

Parametric Model - Materialization



Seed: 214

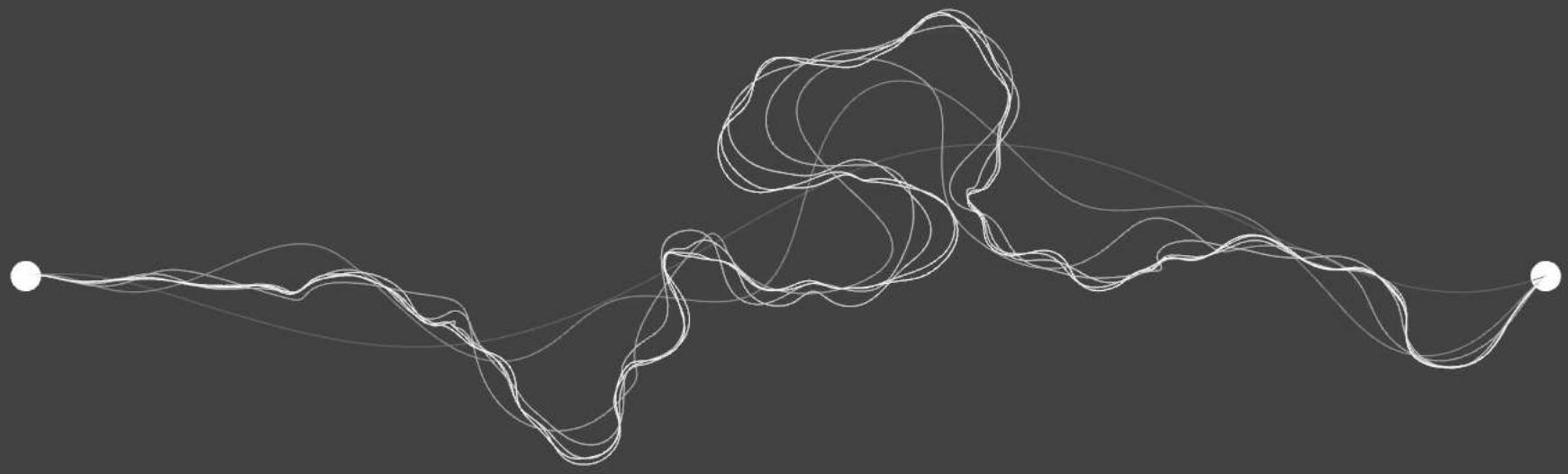
Iteration: 10

No. Control Points: 1006

Line Length: 910.96

Conclusion

Parametric Model - Materialization



Seed: 65

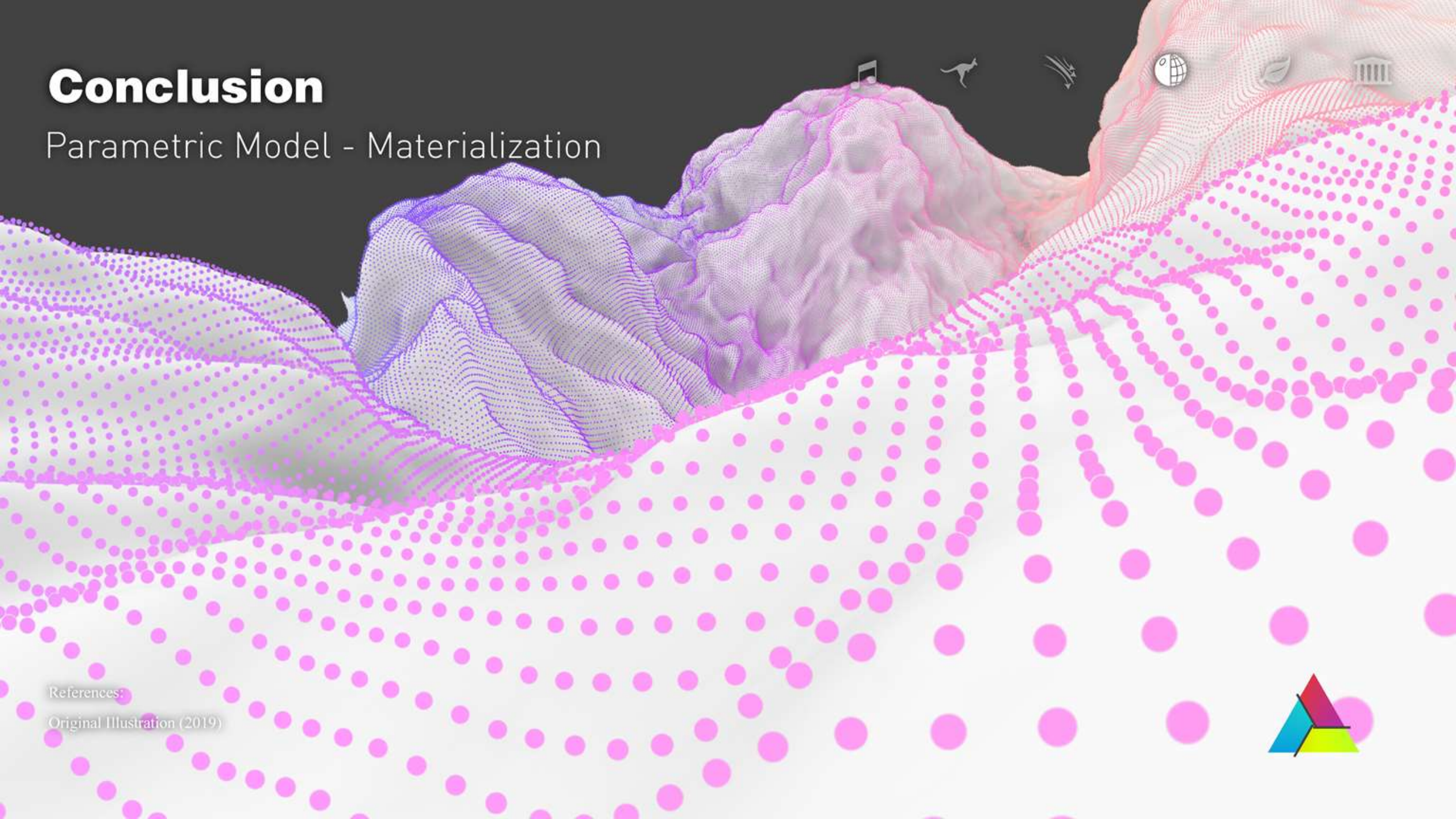
Iteration: 6

No. Control Points: 218

Line Length: 279.33

Conclusion

Parametric Model - Materialization



References:

Original Illustration (2019)

Conclusion

Parametric Model - Materialization

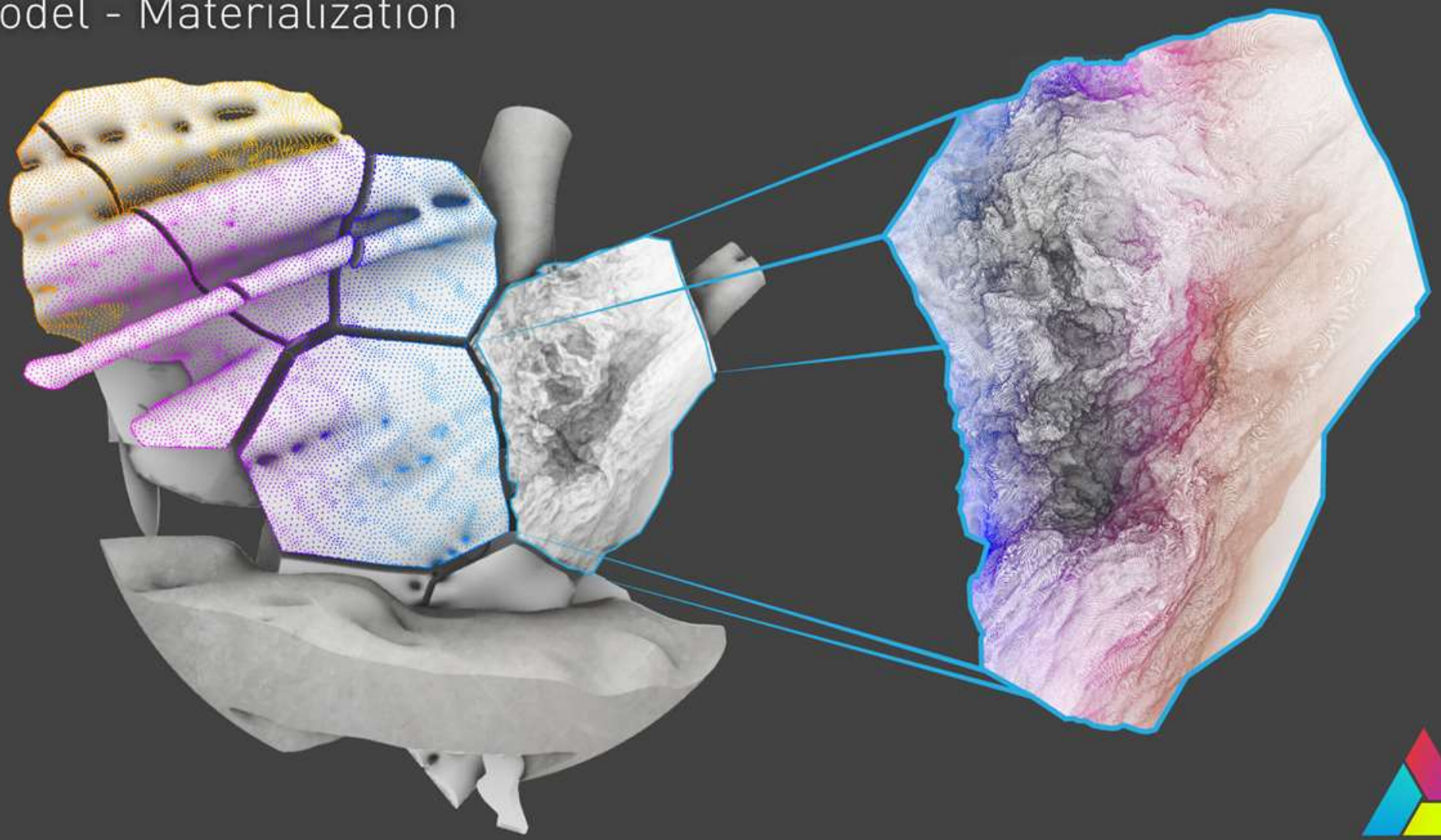
References:

Original Illustration (2019)

Conclusion

Parametric Model - Materialization

A lpha
H ue
S aturation
L uminance

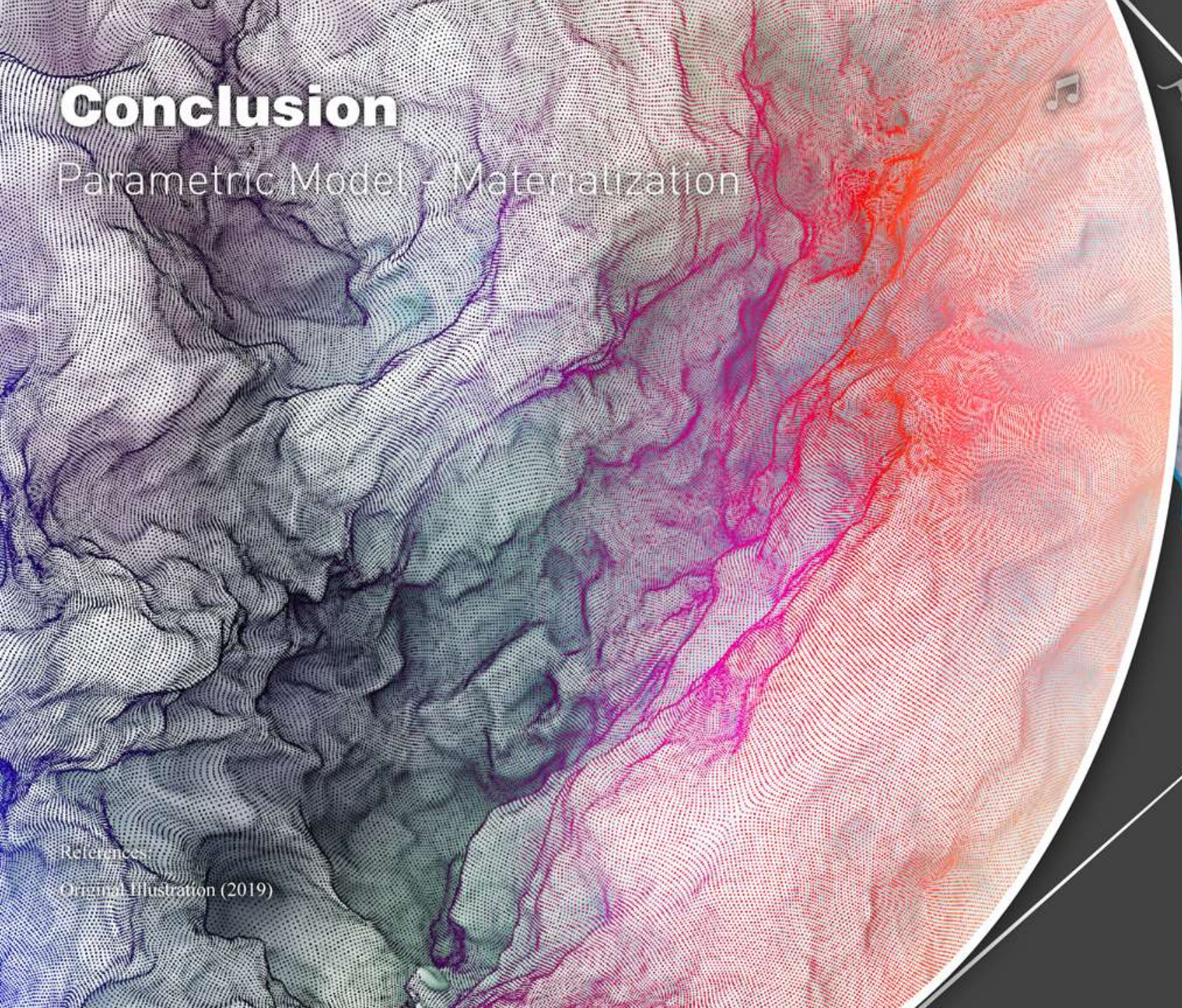


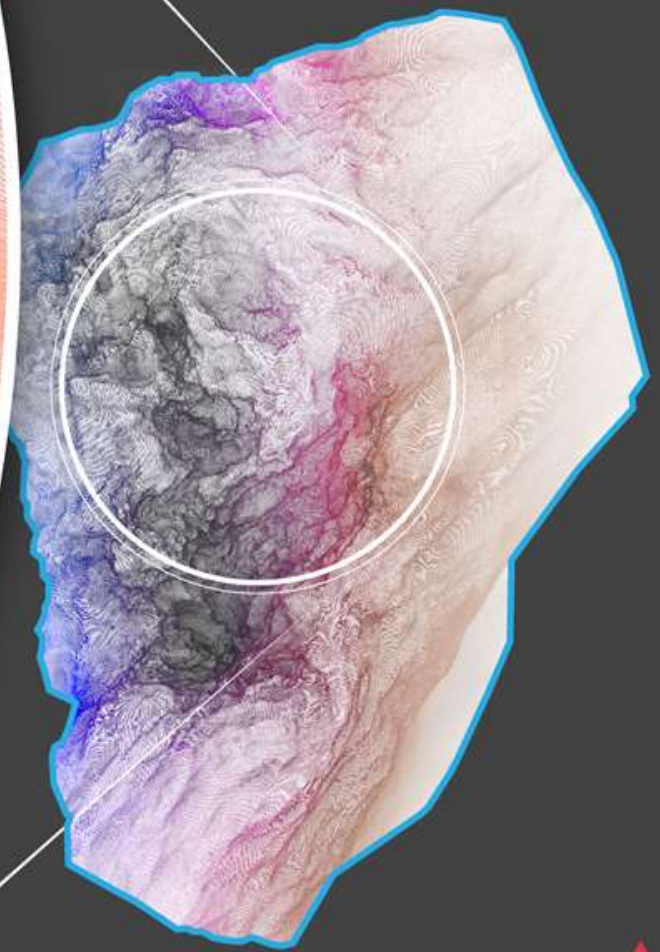
References:

Original Illustration (2019)

Conclusion

Parametric Model - Materialization



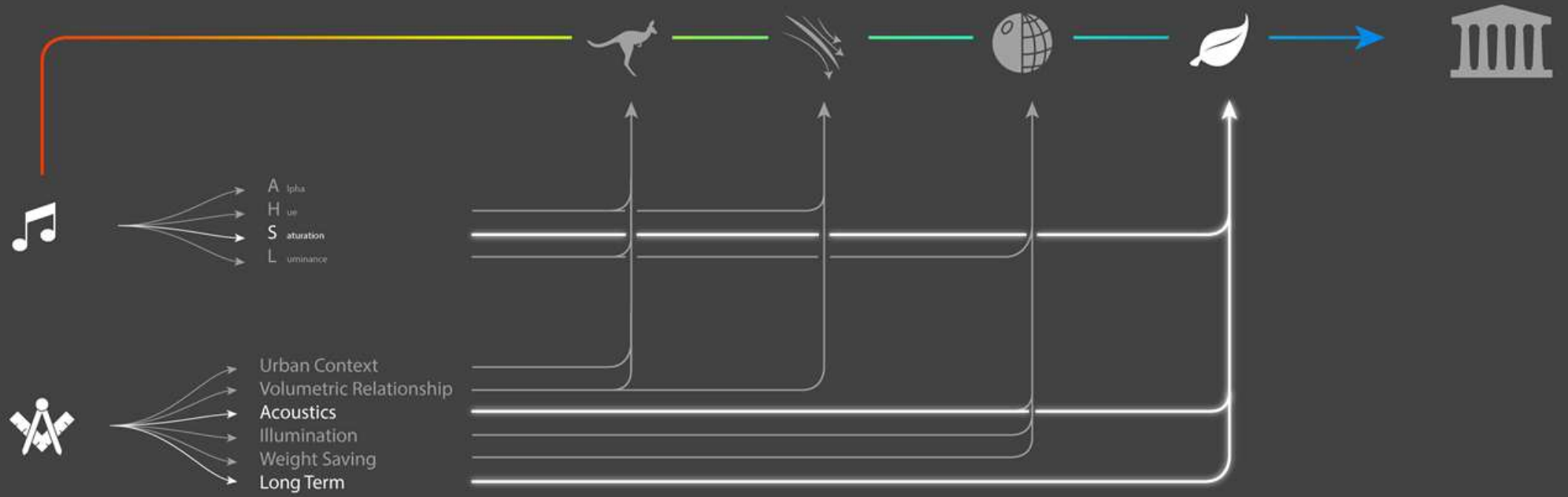


References:

Original Illustration (2019)

Conclusion

Parametric Model - Construction



References:

Original Illustration (2019)

Conclusion

EPS Milling vs 3D Printing

References:

rosettacommunicatie.nl, n.d.

Conclusion

3D Printed Sandstone Grotto

References:

Osman Bari, archdaily.com (2019)

Conclusion

3D Printed Sandstone Grotto

References:

Osman Bari. archdaily.com (2019)

Conclusion

The Cave Paintings of Lascaux

References:

Various artists. thalo.com (n.d.)

Conclusion

Rosetta Stone

References:

rosettacommunicatie.nl. n.d.

Conclusion

Vienna

References:

Original Illustration (2019)

Conclusion

Vienna

References:

Original Illustration (2019)

Synesthesia

An Exploration of Architectural Experience as Expressed by Music

P5 Presentation by Roel Westrik

Henriette Bier
Sina Mostafavi
Ferry Adema

25-06-2019