

Cloud Native Geospatial Analytics at JLL



Yanqing Zeng
Lead Data Scientist, JLL



Luis Sanz
CEO, CARTO

CARTO

Unlock the power of spatial analysis

>2,200
Customers

150+
Team members

INSIGHT
PARTNERS

Accel



European
Innovation
Council
Fund

EARLYBIRD

KIBO
VENTURES



HEARST
DATA
SUMMIT 2022

CARTO ●

The difference between
knowing where and
knowing why.

For a wide range of use cases:



Network Planning & Management
Data Monetization



Site Planning
Indoor Mapping
Supply Chain Design



Last Mile Logistics
Territory & Warehouse Planning
Fleet Routing & Tracking



Equity Index Dashboard
Climate Resilience
Smart Cities
Public Safety



Investment Analysis
Pricing Optimization
Data Monetization



Risk Assessment
Investment Analysis
Fraud Detection
Geomarketing



Territory Management
Site Planning
Healthcare Factor Analysis



EV Infrastructure Rollout
Territory Management
Churn Reduction

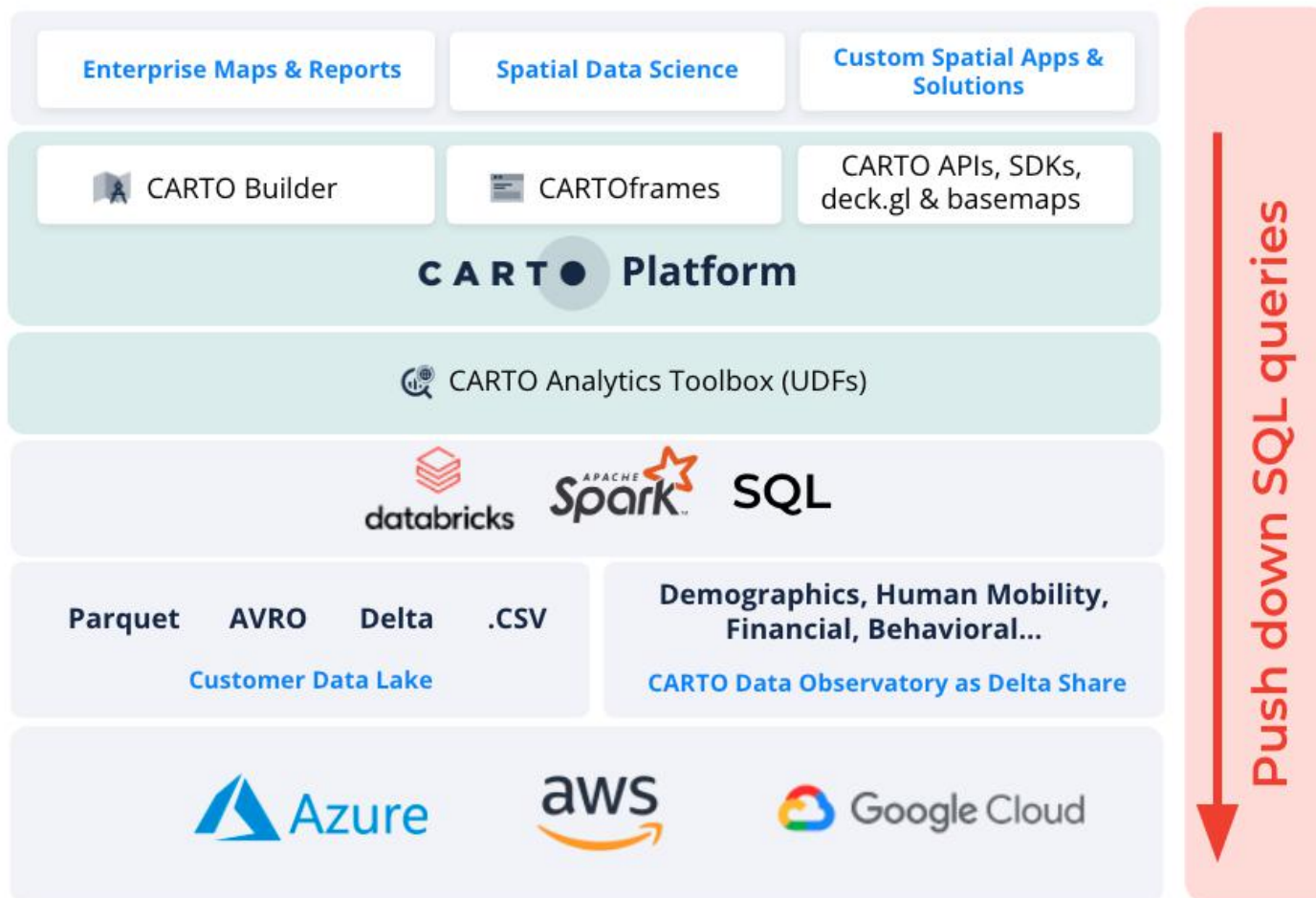
CART ●

Spatial Extension for Databricks

Bringing advanced spatial analytics to the
Lakehouse Platform



CARTO Spatial Extension for Databricks



What does JLL do?



#186 Fortune 500

~98,200 employees

19.4B revenue

~80 countries

What does JLL do?



Residential

Offices

Wealth

Retail



*Why is Geospatial analysis
so important ?*

What's the
challenge and
opportunity in real
estate ?



“

***How might we track the
international trend
and property value***

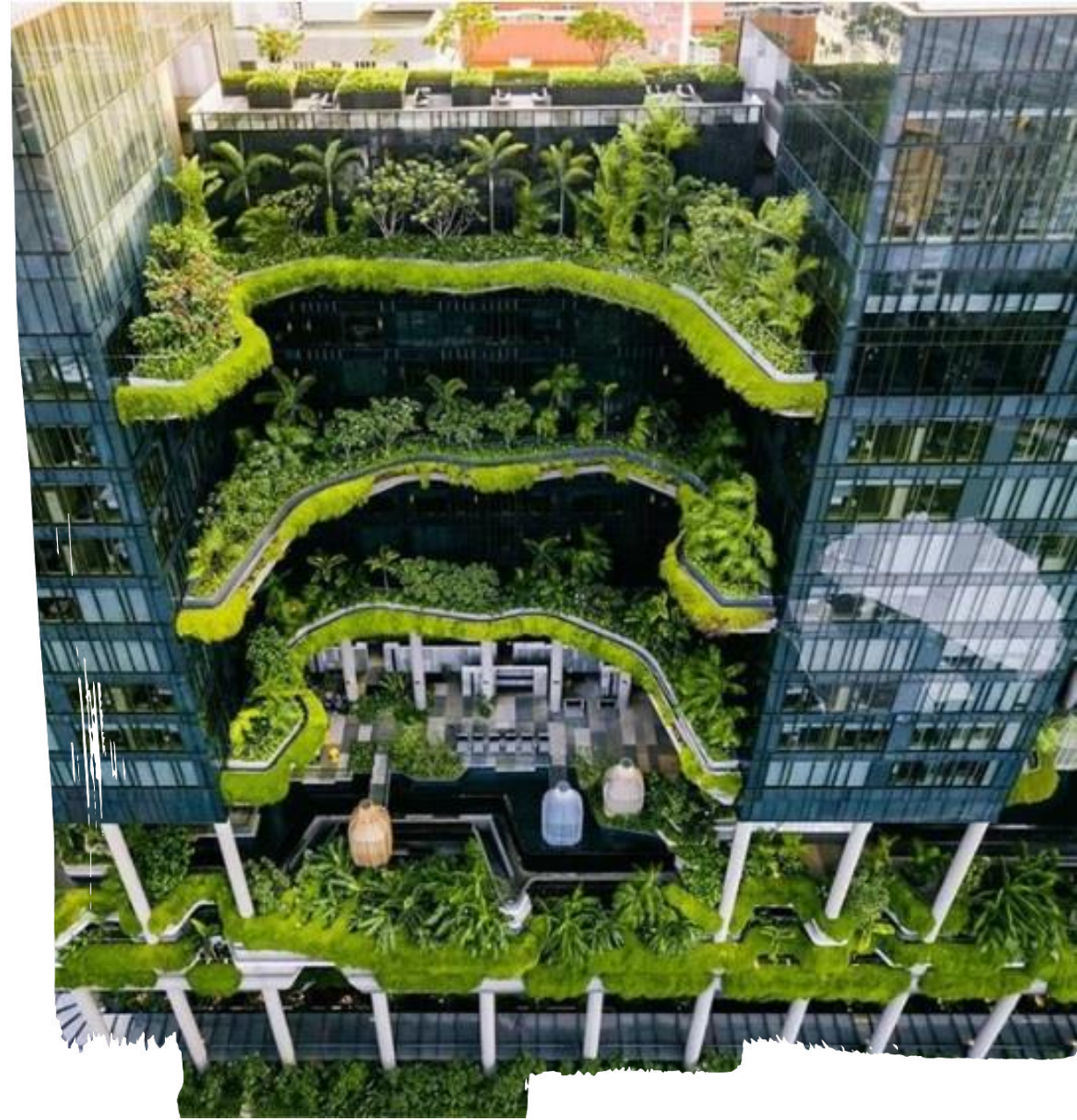
in real-time ?



“

How might we help our clients meet their

ESG goals ?



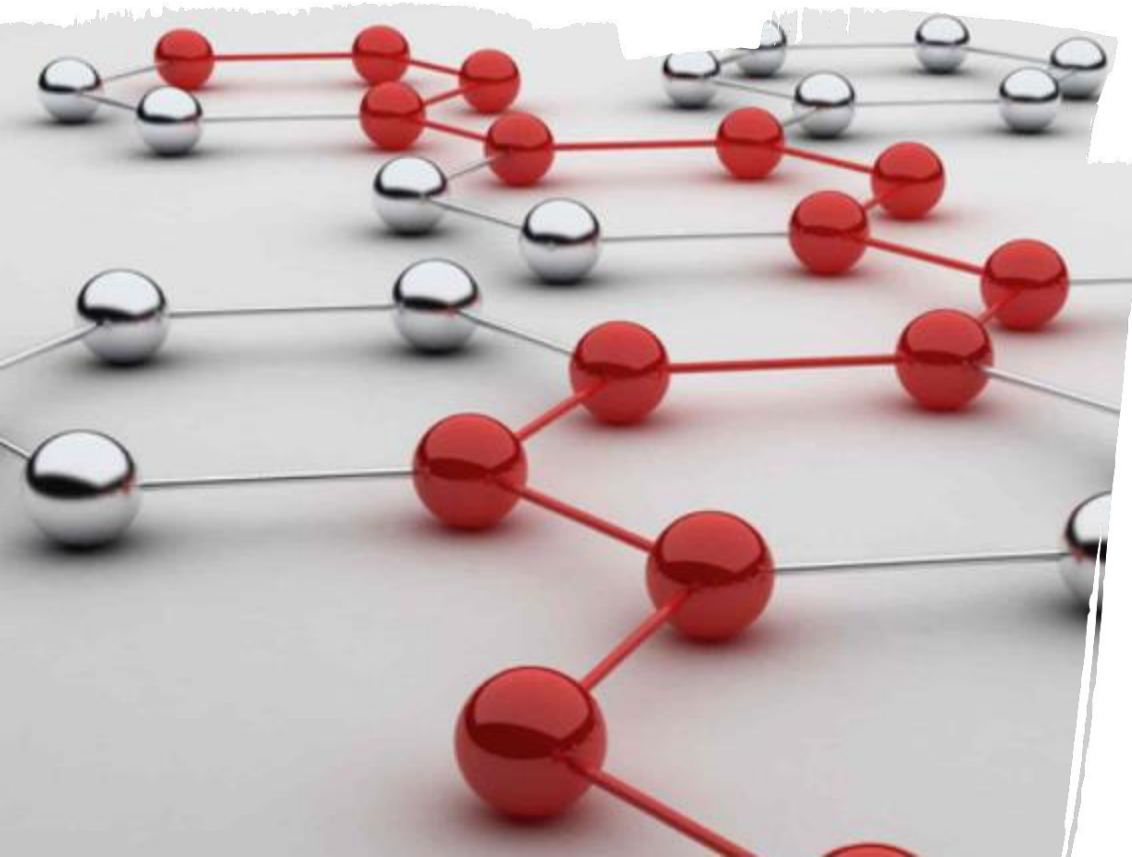
“

***How might we provide
our clients a***

full risk insight ?




“



How might we

***go beyond
tabular data?***



*How we use geospatial
data and analysis*



Property Information

- Asset Location
- Asset Cashflow
- Landlord
- Current Tenant
- Photos



Transaction/Comparable

- Axiometric
- REIS
- CoStar
- ALN
- Marketsphere
- RCA
- Idealist
-



Portfolio

- Client Information
- Current Valuation Details
- Asset list
- Historical Valuation



Geography

- Administrative Division
- Census Boundaries
- Cadastral Boundaries
- Building Polygons
- Real Estate Market Boundaries
- Road Lines
- Railway, Ferry Routes



Market

- Price Trend
- Volume
- Volatility
- Avg Days On Market
- Offer
- Demand



Point Of Interests

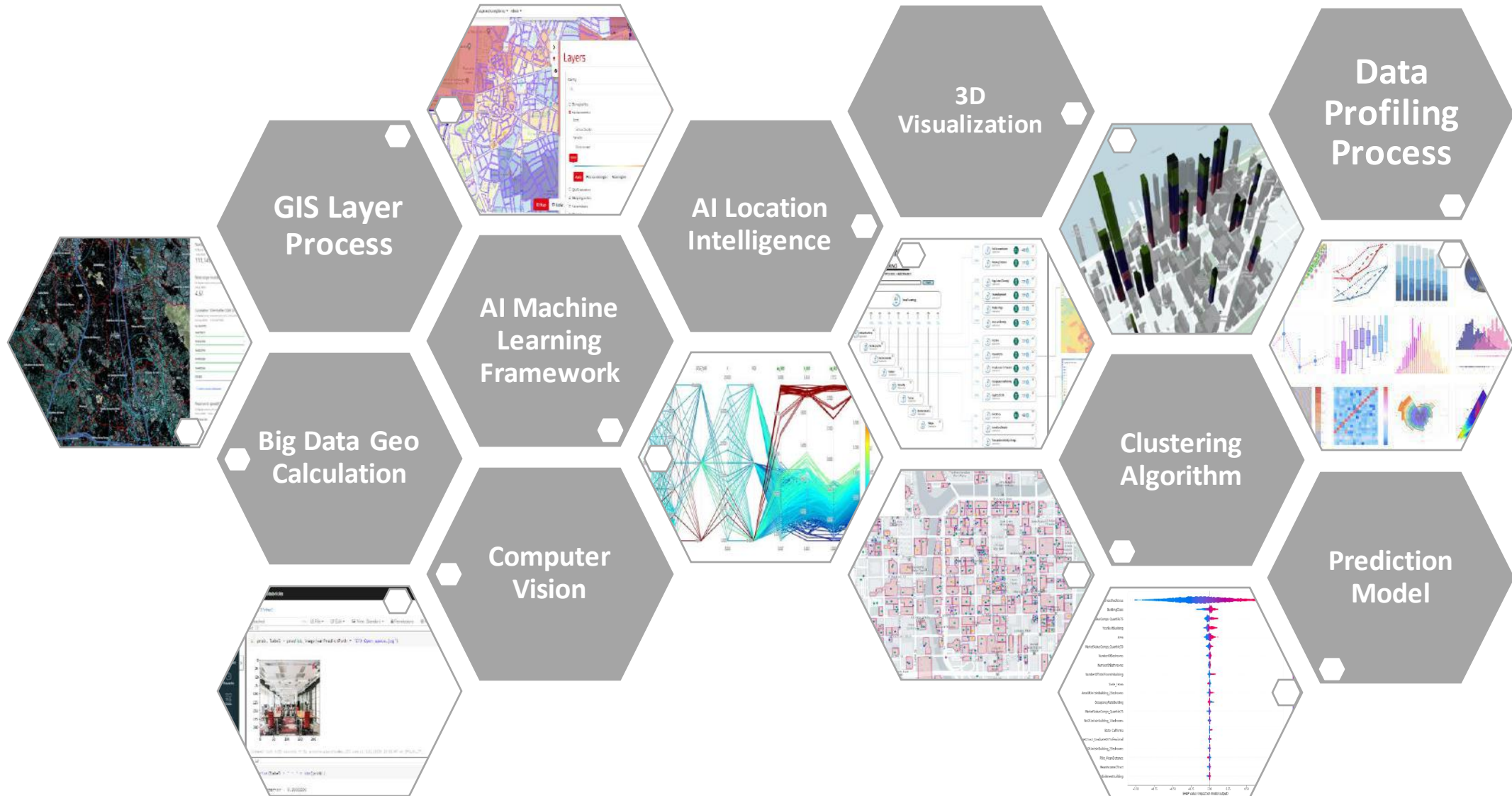
- Shops
- Restaurants and Bars
- Police
- Hotel
- Bank
- Airport
- Transport Stations
-



Environmental

- Flood Risk
- Fire Risk
- Tornado Risk
- Earthquake Risk
- Air Quality
- Storm Risk

Modularized Solution + Ecosystem



ML Framework

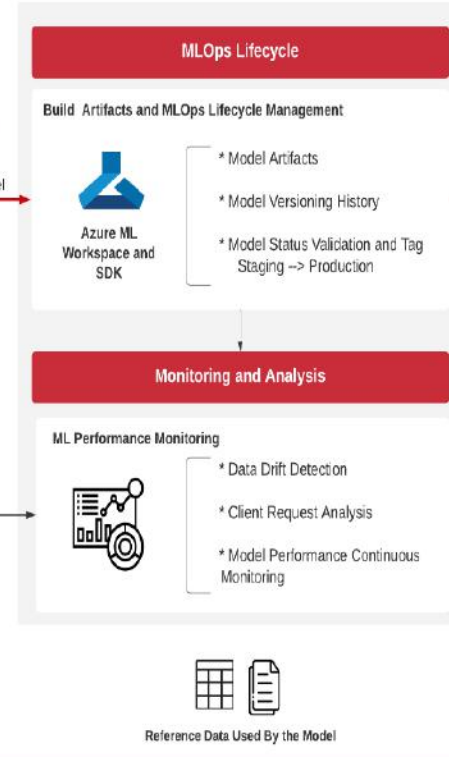
Data Source

- API or External Website
- SQL Database
- IOT and Event Hub
- GEO Shape
- Other Unstructured data
- Image and Document

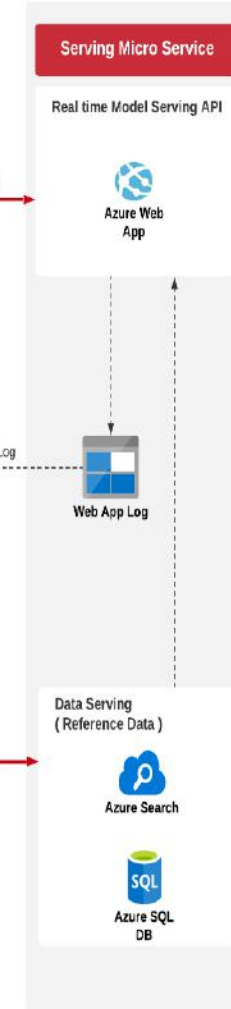
Training



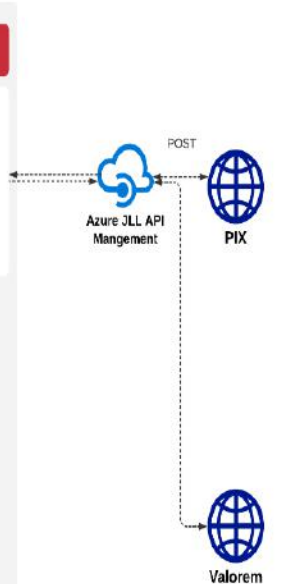
MLOps Lifecycle Management



Serving

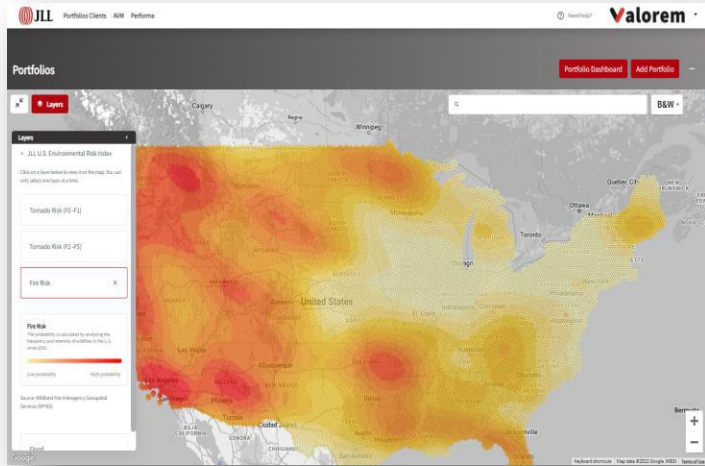


Application



A selection of our projects

Spatial Analysis



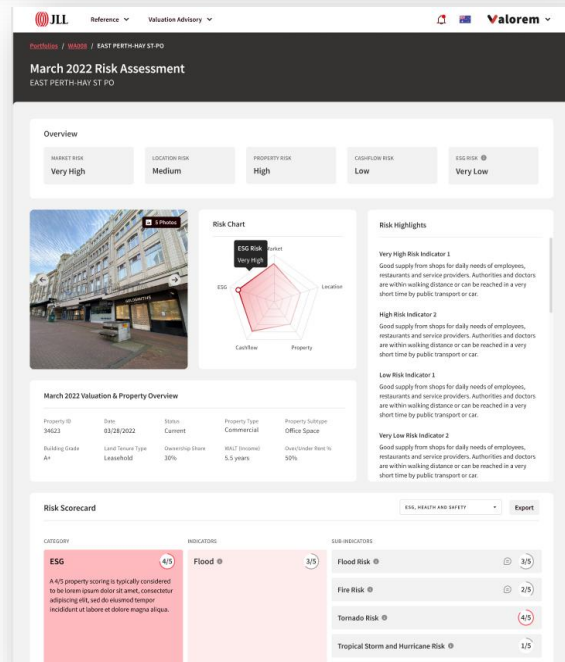
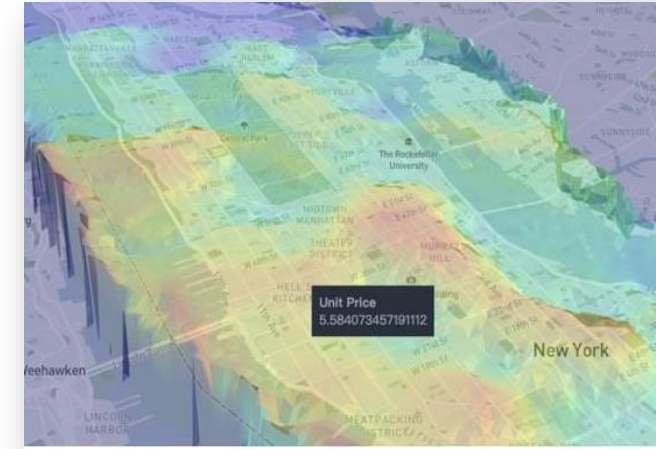
◀ **GIS Map Layer**

Global
Multi systems

Spatial-temporal modeling

Market Value ▶

Spatial Inference
3D Visualization

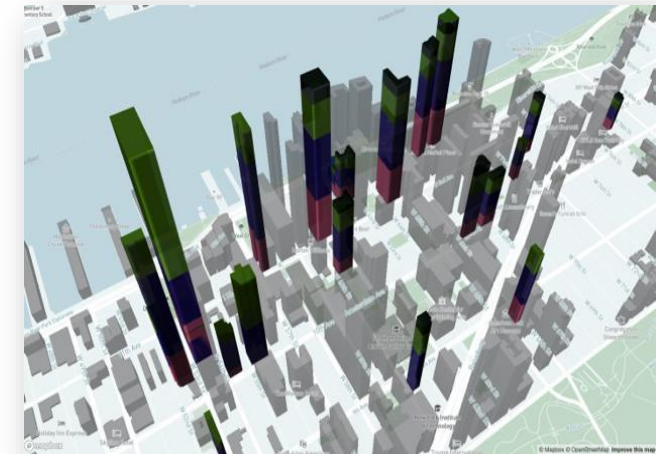


◀ **AI Risk Assessment**

Global

Property Grouping ▶

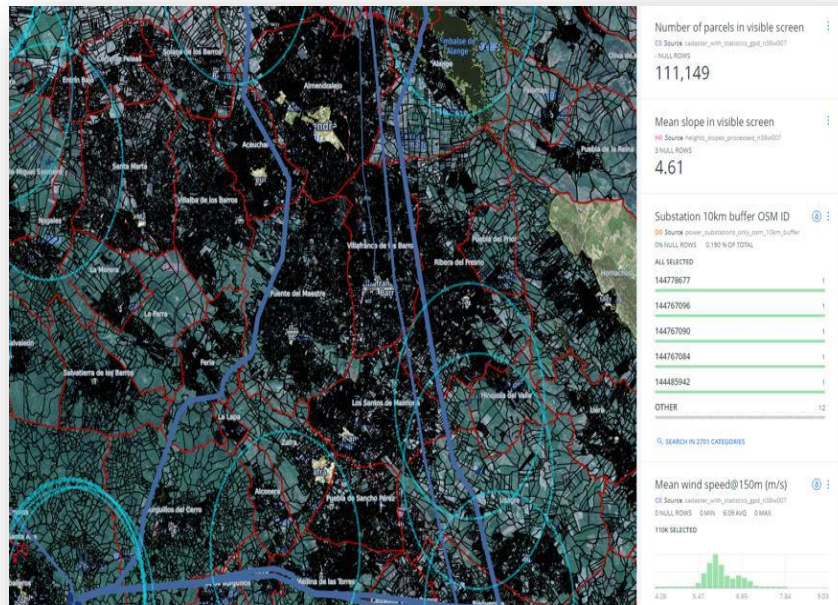
Machine Learning
Clustering
3D Visualization



Location Intelligence

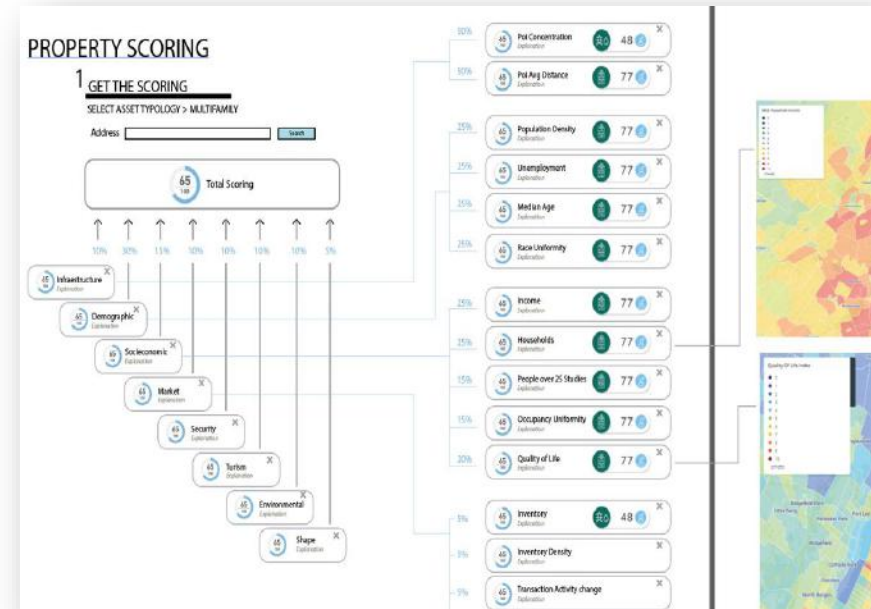
Mappergy

Location Intelligence
Sustainability ESG Investment



Property Scoring

Location Intelligence
Global Source



Link Spatial Analysis with AI + AR

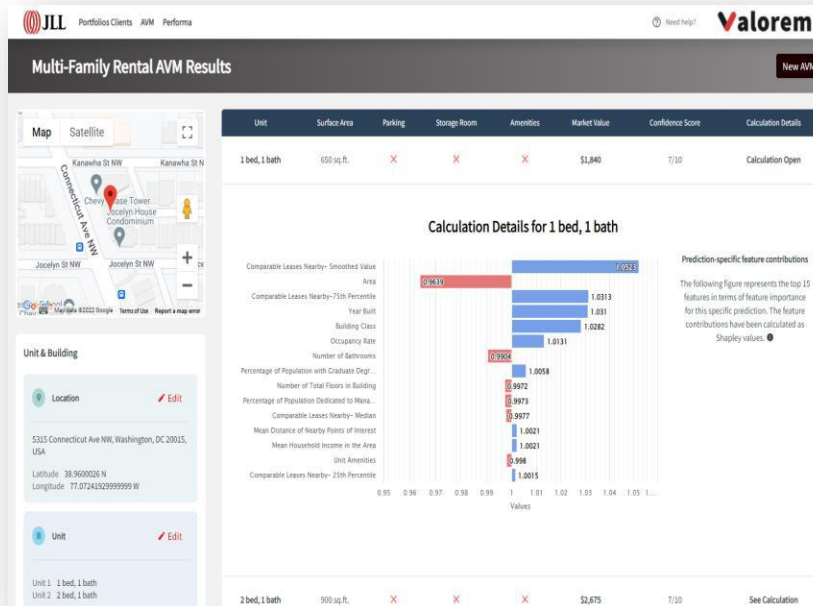
AR Location Intelligence

Spatial Analysis + AR



AI Valuation Model

Machine Learning Valuation



Satellite Image Tagging

Computer Vision + AI+ Spatial analysis



Project Details and Demo

Spatial
Analysis

Spatial-
temporal
Modeling

Location
Intelligence

Link LI with
AI+AR

Project Details and Demo



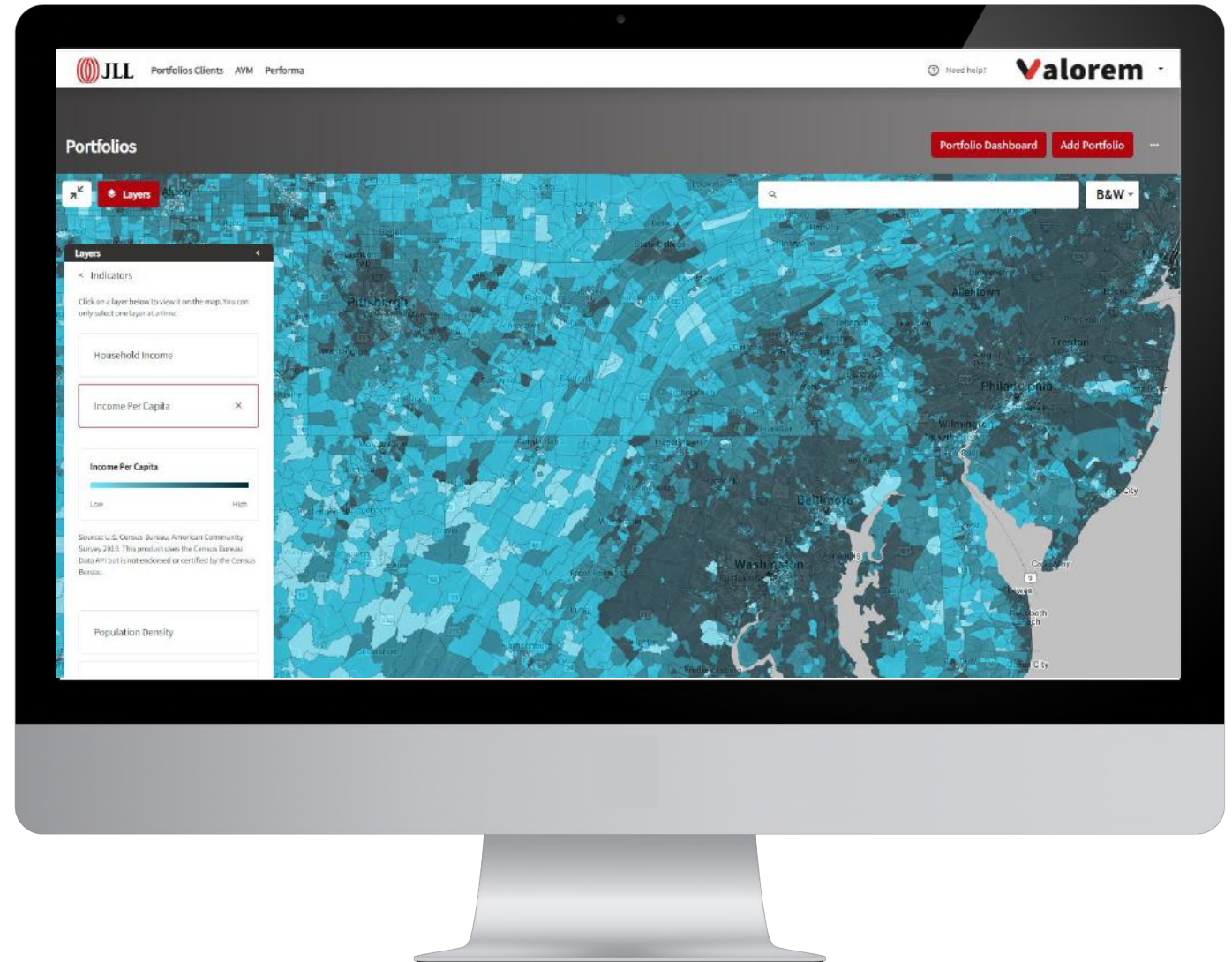
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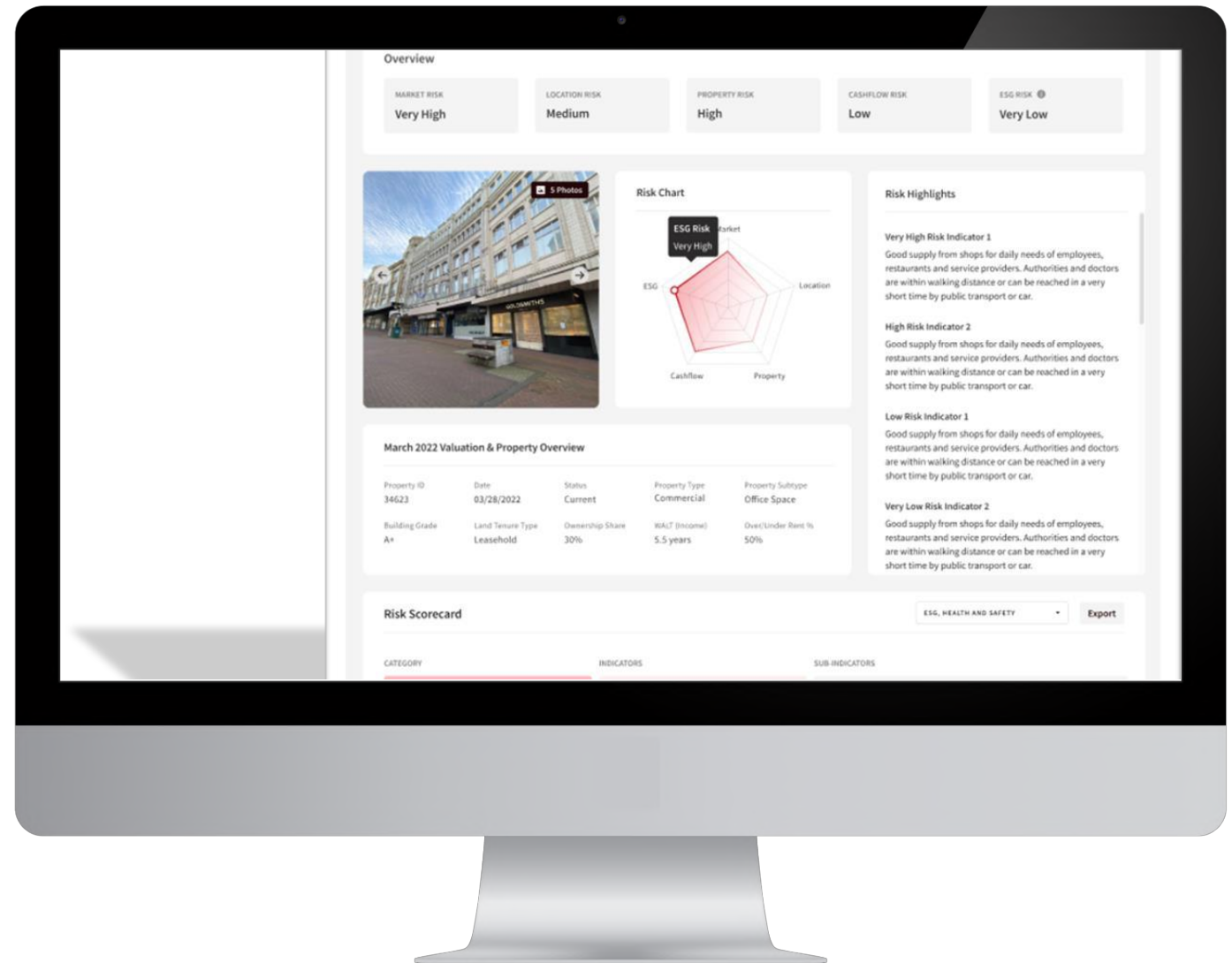
GIS Map Layer





AI Risk Assessment

- > ESG Factors
- > Market Risk
- > Socioeconomic
- > Demographic
- > POIS





Infrastructure



Market



Demographic



Tourism



Socioeconomic



Security



Environmental



Shape

March 2022 Risk Assessment

EAST PERTH-HAY ST PO

Overview

 MARKET RISK
Very High

 LOCATION RISK
Medium

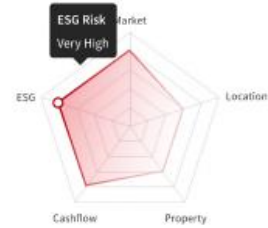
 PROPERTY RISK
High

 CASHFLOW RISK
Low

 ESG RISK ⓘ
Very Low


5 Photos

Risk Chart



Risk Highlights

Very High Risk Indicator 1

Good supply from shops for daily needs of employees, restaurants and service providers. Authorities and doctors are within walking distance or can be reached in a very short time by public transport or car.

High Risk Indicator 2

Good supply from shops for daily needs of employees, restaurants and service providers. Authorities and doctors are within walking distance or can be reached in a very short time by public transport or car.

Low Risk Indicator 1

Good supply from shops for daily needs of employees, restaurants and service providers. Authorities and doctors are within walking distance or can be reached in a very short time by public transport or car.

Very Low Risk Indicator 2

Good supply from shops for daily needs of employees, restaurants and service providers. Authorities and doctors are within walking distance or can be reached in a very short time by public transport or car.

March 2022 Valuation & Property Overview

Property ID	Date	Status	Property Type	Property Subtype
34623	03/28/2022	Current	Commercial	Office Space
Building Grade	Land Tenure Type	Ownership Share	WALT (Income)	Over/Under Rent %
A+	Leasehold	30%	5.5 years	50%

Risk Scorecard

ESG, HEALTH AND SAFETY ▾

Export

CATEGORY	INDICATORS	SUB-INDICATORS
ESG 4/5 A 4/5 property scoring is typically considered to be lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.	Flood ⓘ 3/5	Flood Risk ⓘ 3/5
		Fire Risk ⓘ 2/5
		Tornado Risk ⓘ 4/5
		Tropical Storm and Hurricane Risk ⓘ 1/5

Project Details and Demo

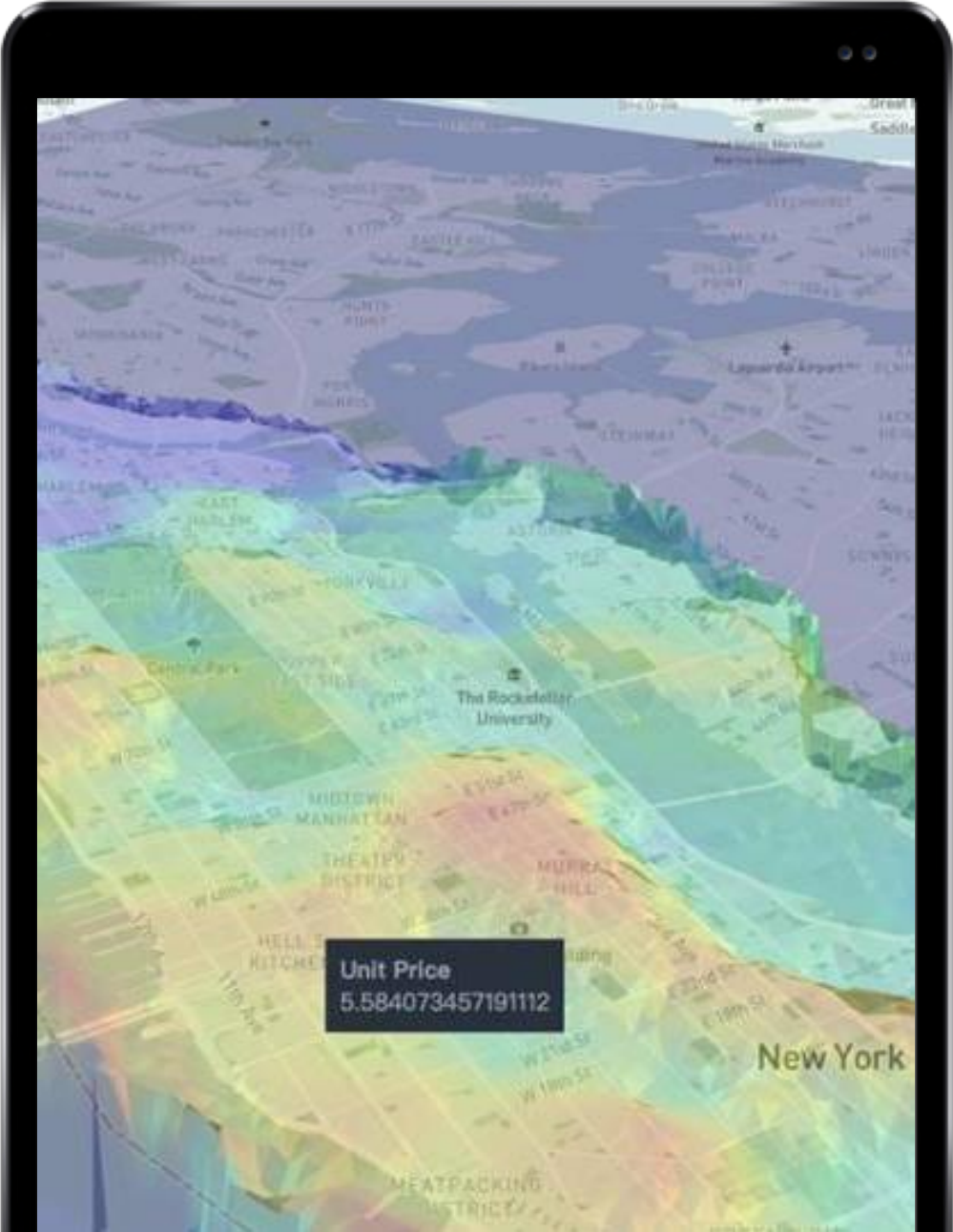
Spatial
Analysis

Spatial-
temporal
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AI+AR

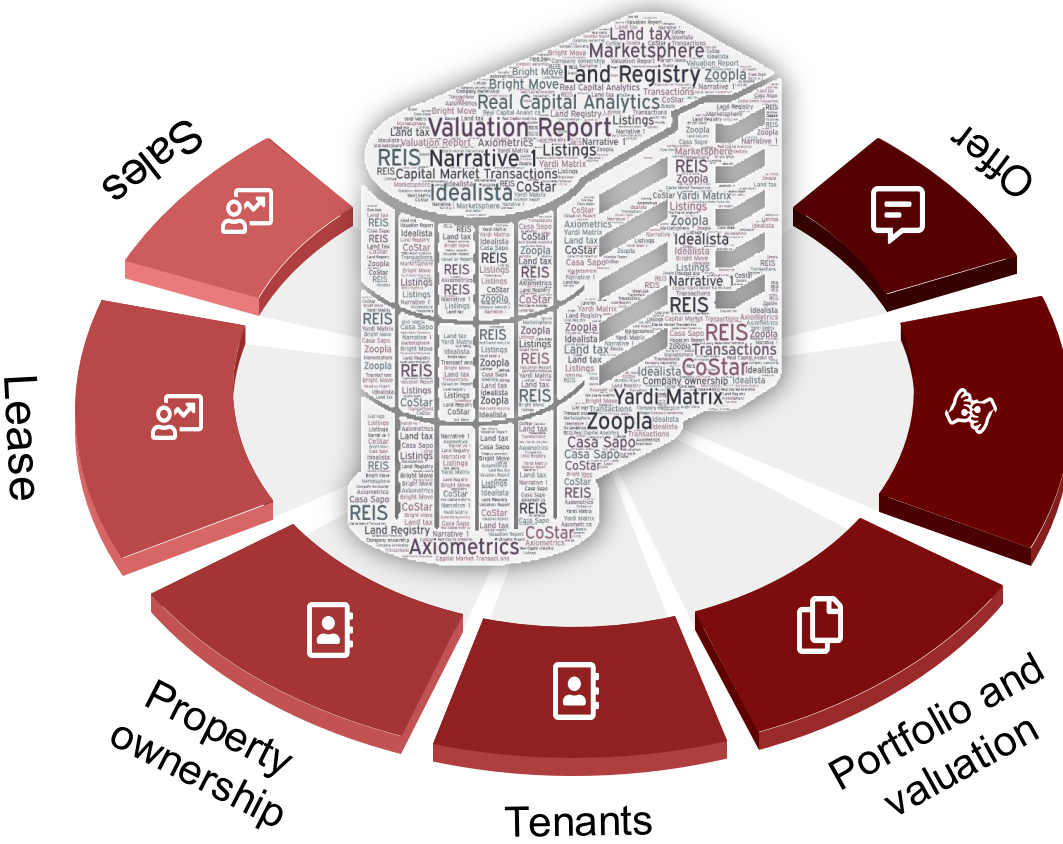
Market Indicators



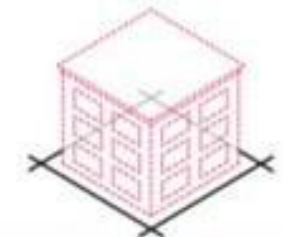
Property Grouping

> DBSCAN Clustering

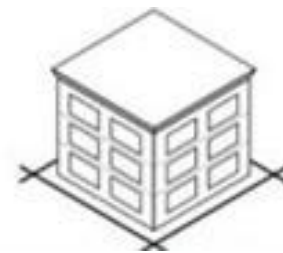




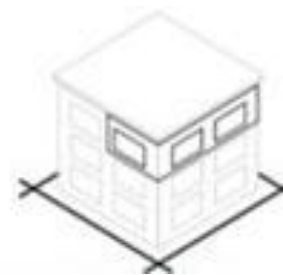
Transaction series (time series)



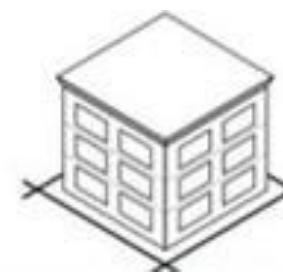
Source A – Transaction 1 (sale)
 Source A – Transaction 2 (sale)
 Source A – Transaction 3 (lease)
 Source A – Transaction 4 (lease)



Source B – Transaction 1 (sale)
 Source B – Transaction 2 (sale)

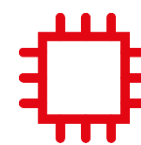
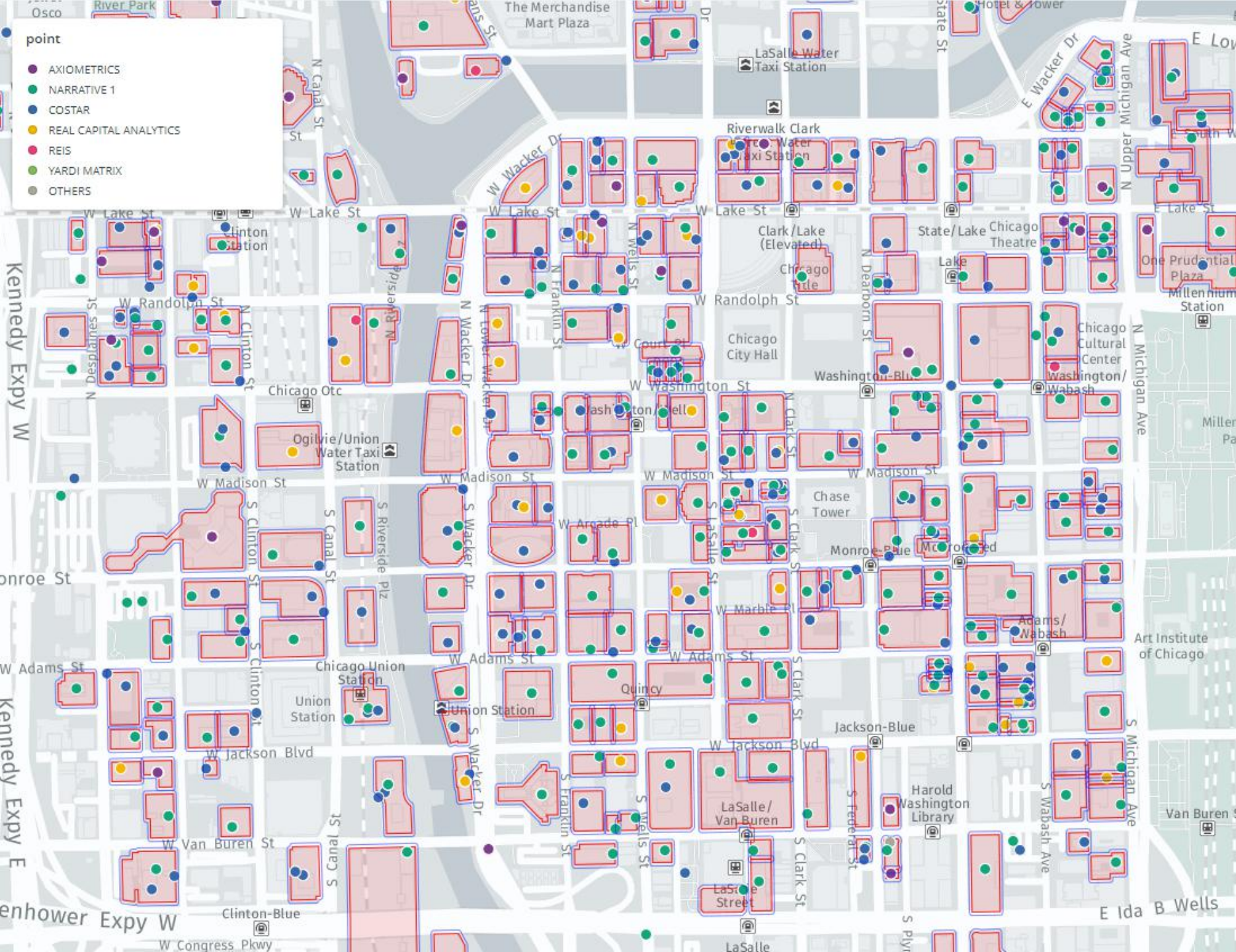


Source C – Transaction 1 (sale)
 Source C – Transaction 2 (sale)
 Source C – Transaction 2 (sale)



Source D – Property 1

PROPERTY A



Clustering



Across Sources

Not just one-to-one match

Project Details and Demo

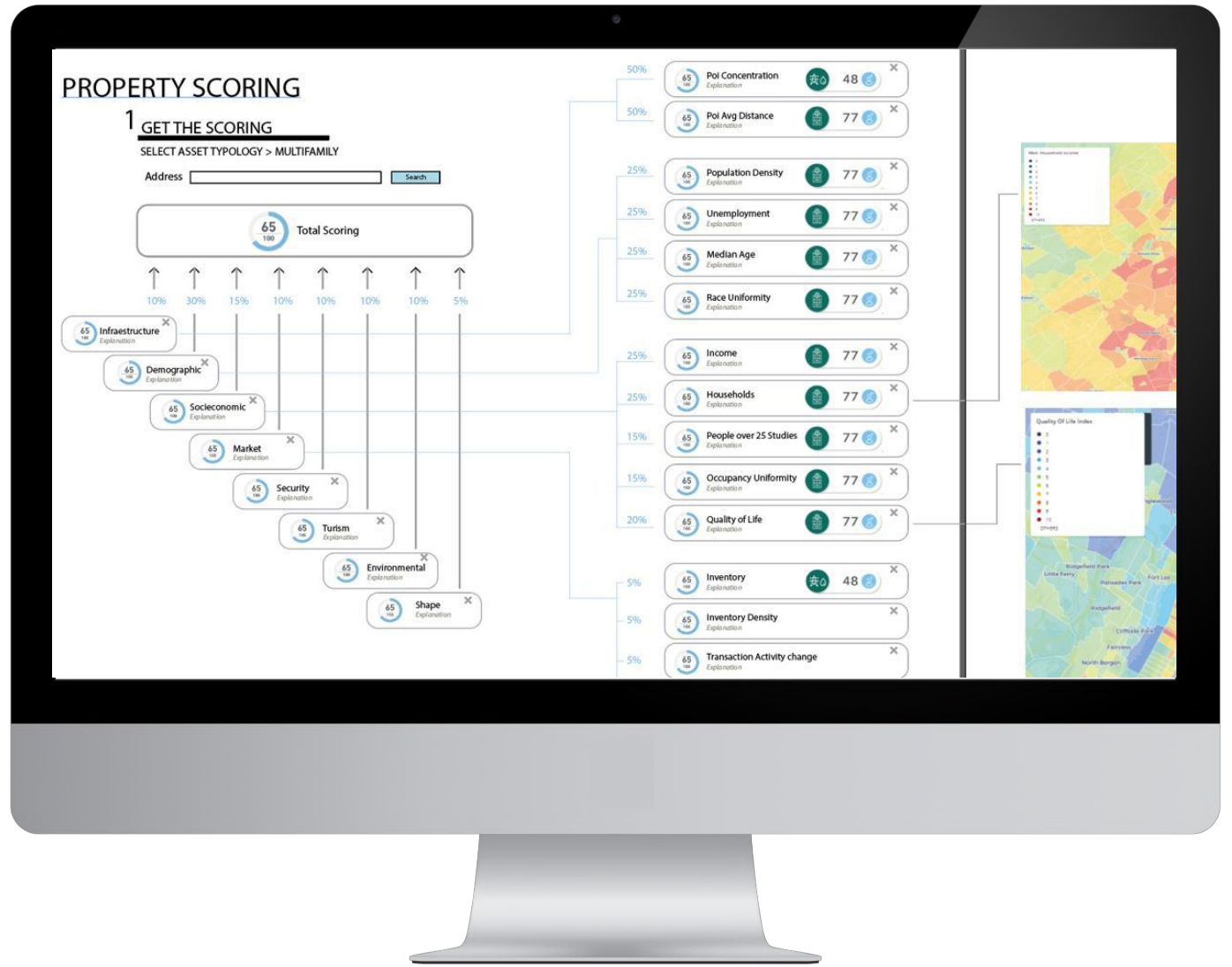
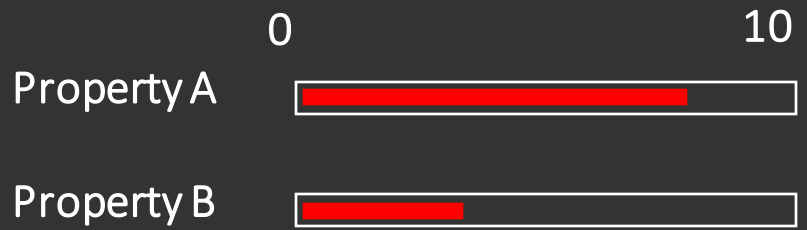
Spatial
Analysis

Spatial-
temporal
Modeling

Location
Intelligence

Link LI with
AI+AR

Property Score Card



Compound scores

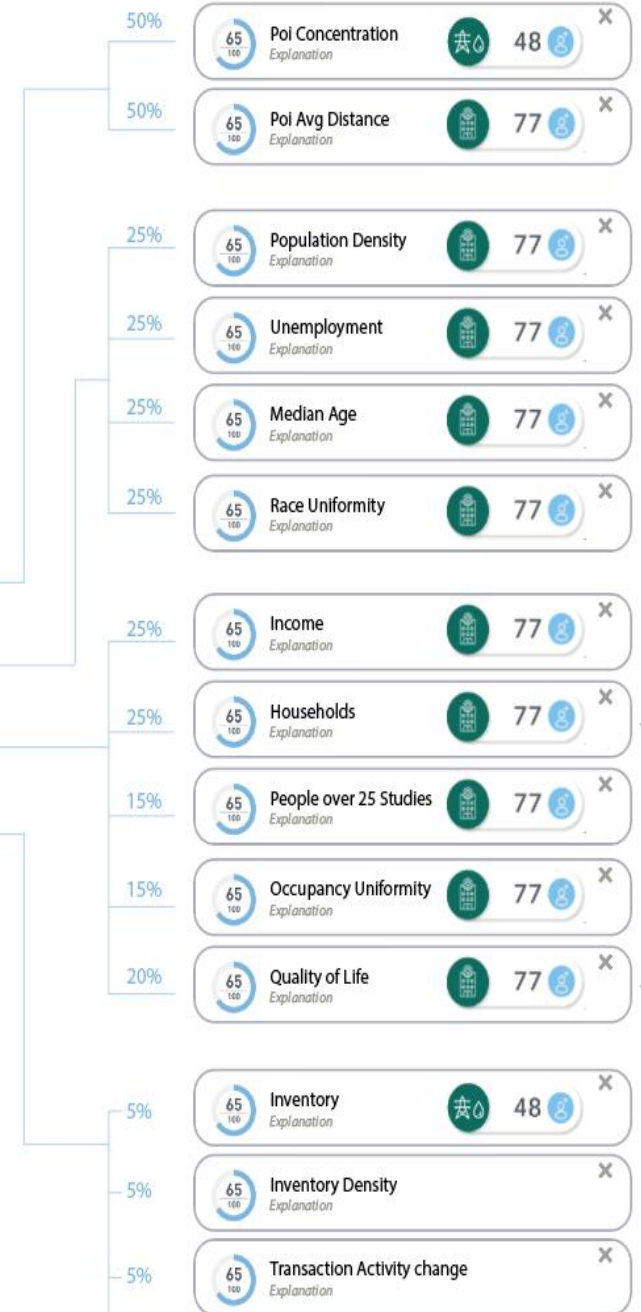
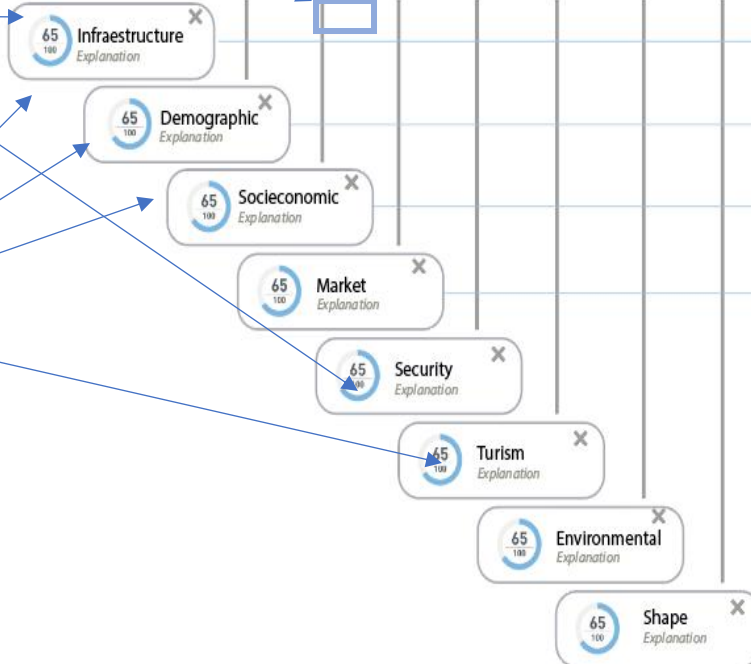
Atomic scores

PROPERTY SCORING

1 GET THE SCORING

SELECT ASSET TYPOLOGY > MULTIFAMILY

Address

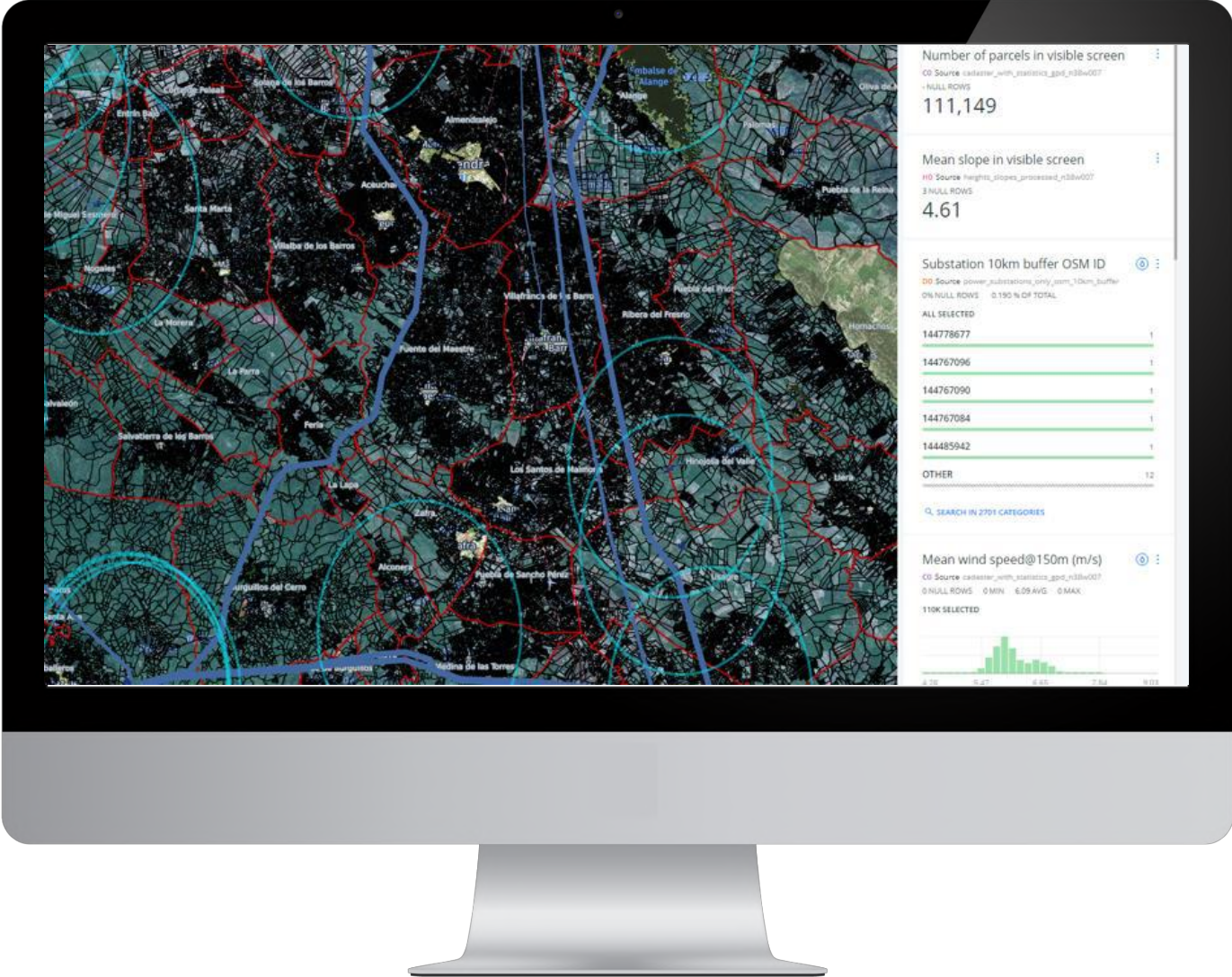


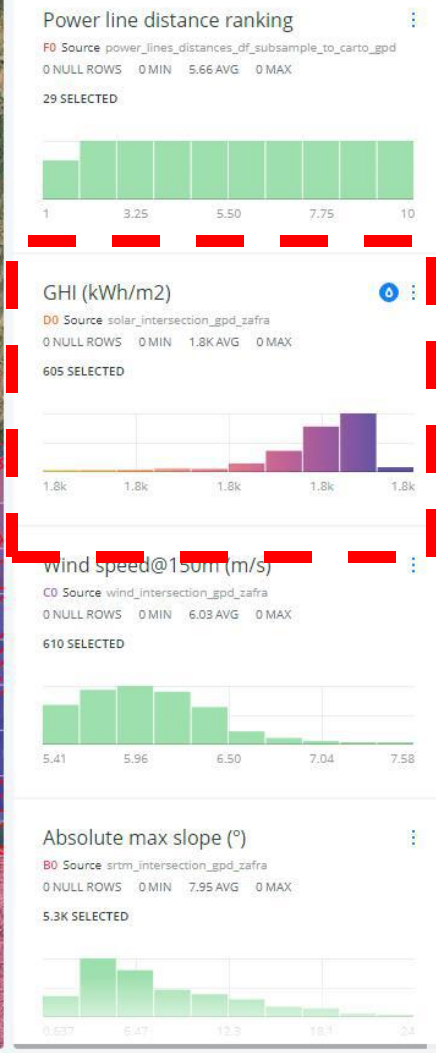
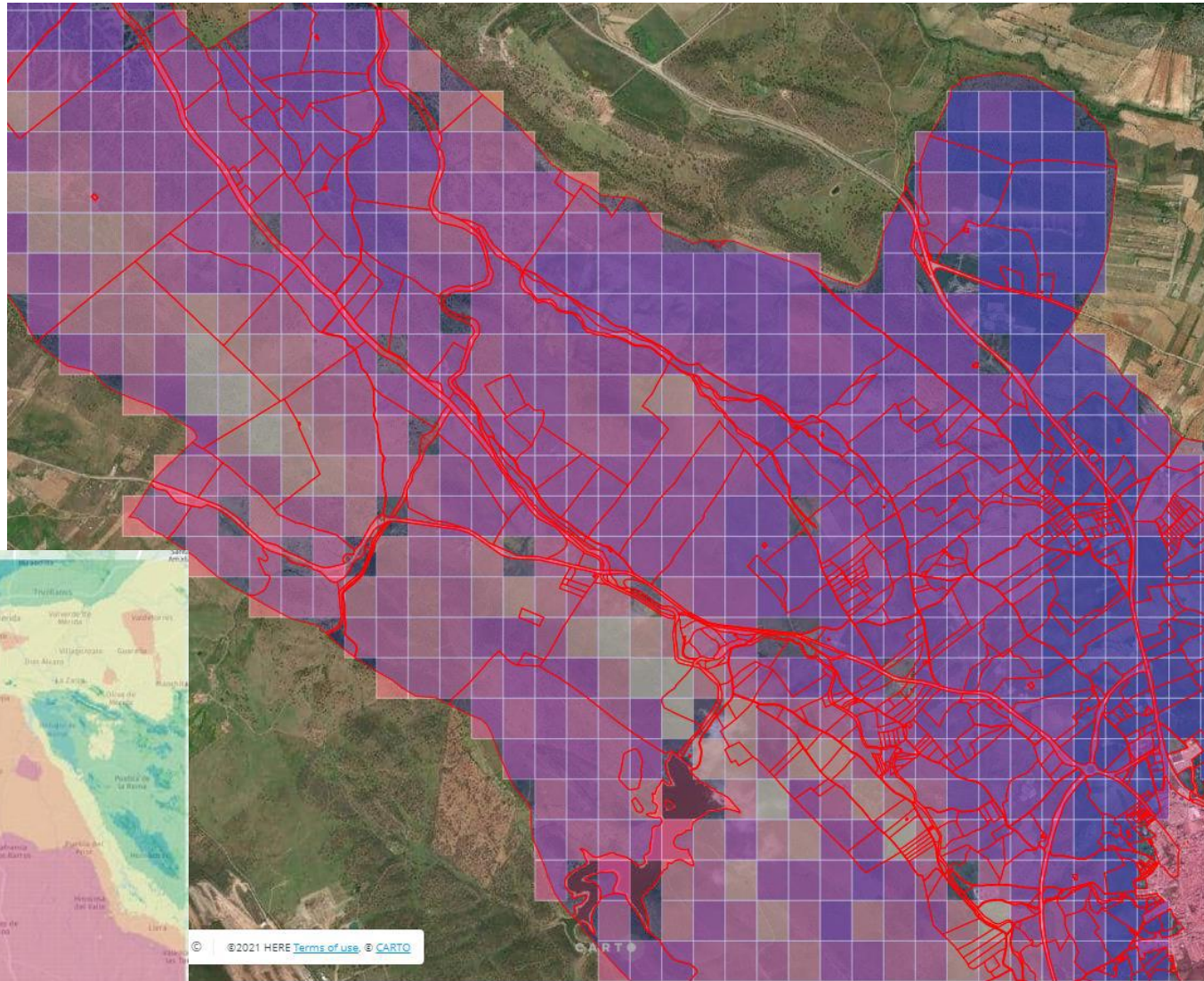
Customizable weights

Retail property investment

Multi-Family property investment

Mappergy





solar_n38w007
spheresolar_n38w007

DATA ANALYSIS STYLE POP-UP LEGEND

Polylines style
CHANGE THE VISUALIZATION

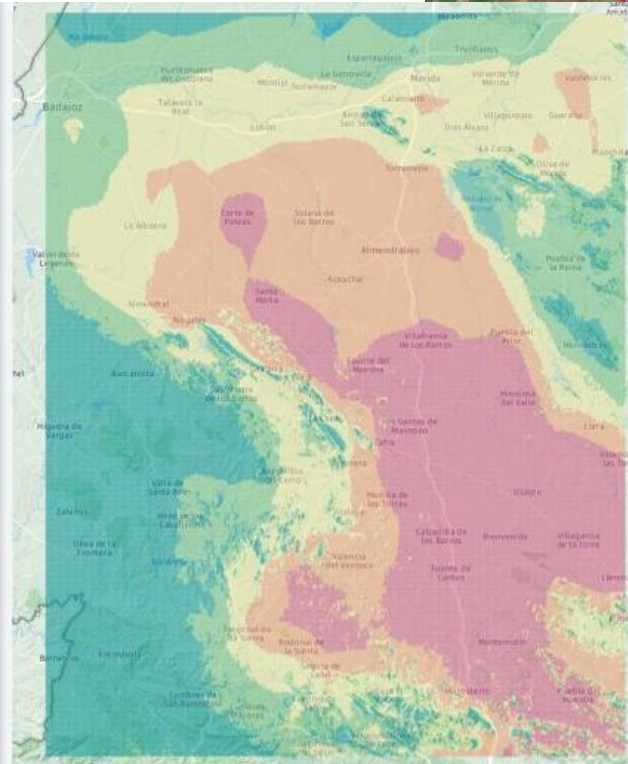
POLYLINE COLOR: Solid By value

STROKE SIZE: 0

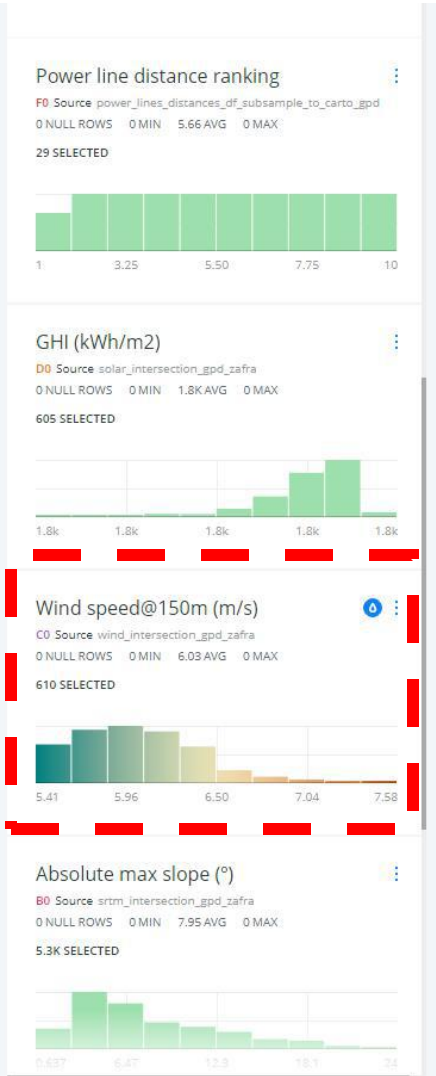
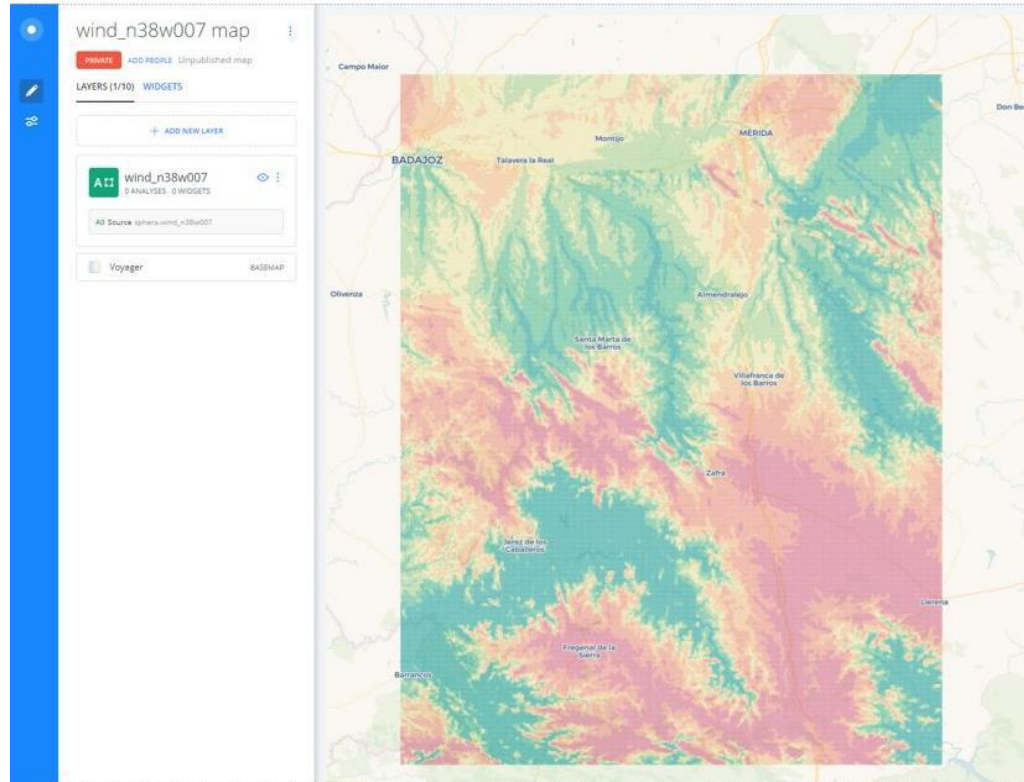
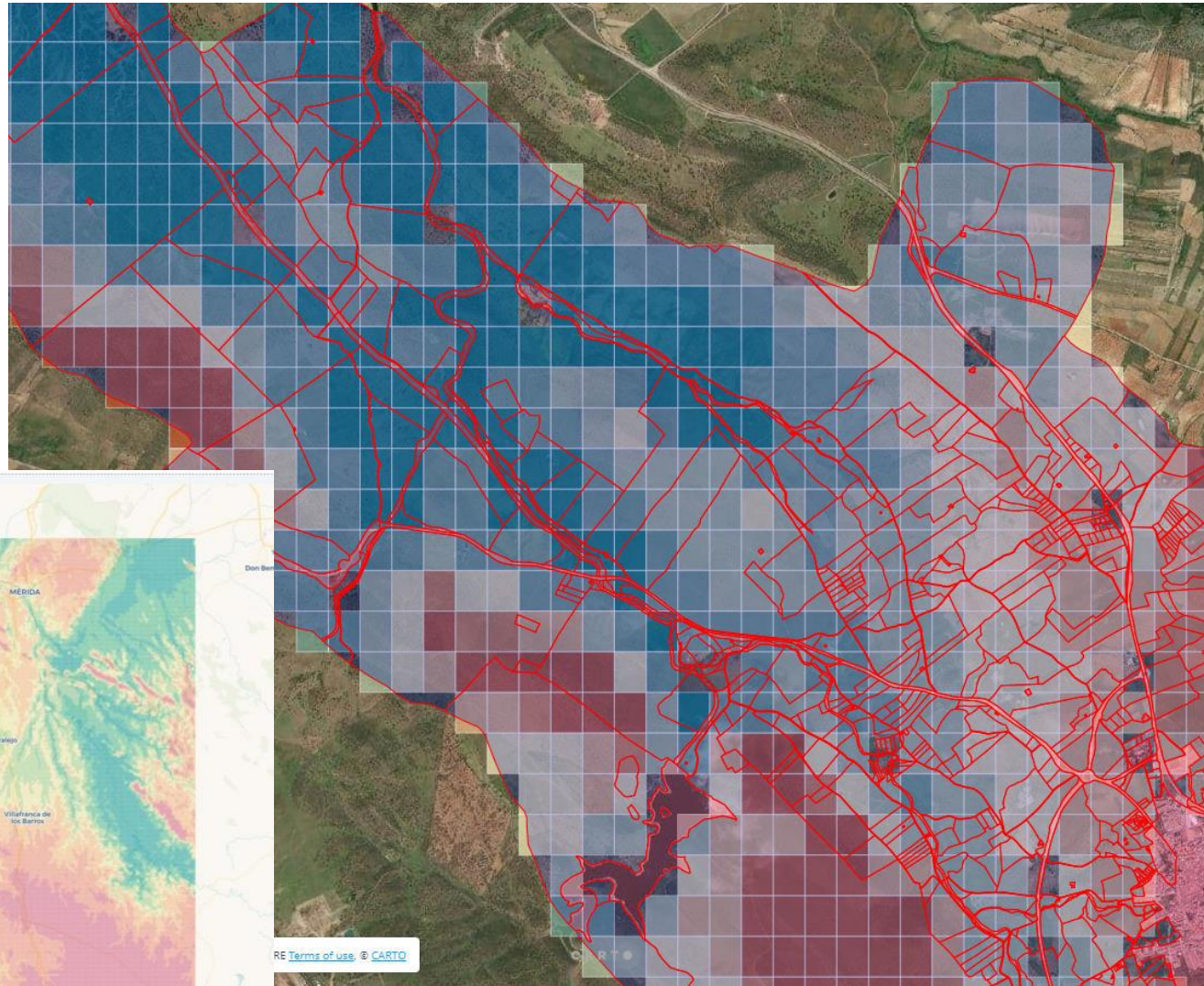
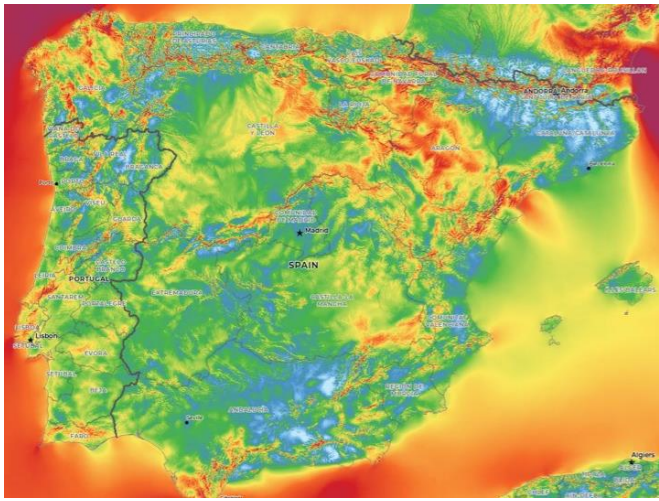
STROKE COLOR: [Color swatches]

BLENDED: none

LABELS



Solar Energy



Wind Data

Central Termosolar La Dehesa

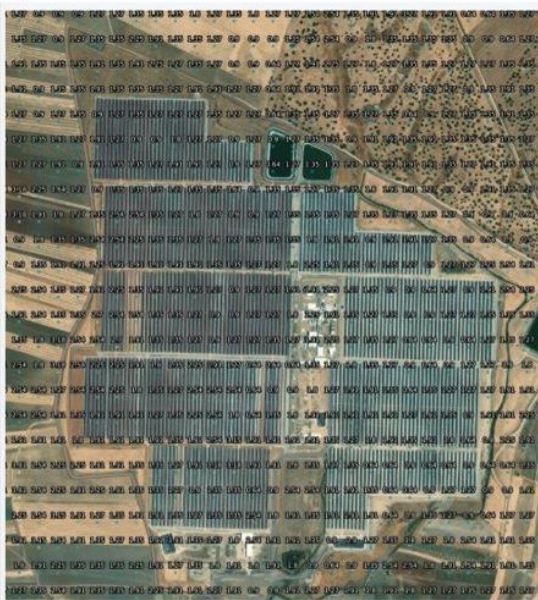
Small slopes <math>< 3^\circ</math>

max_slopes_n38...
 DATA ANALYSER STYLE POP UP LEGEND

Aggregation

Style

FORM SIZE: Fixed By value
 POINT COLOR: Solid By value
 LINE COLOR: By value
 LINE STYLE: Solid
 LINE WIDTH: 2
 LINE DASH: All
 LABEL: On
 LABEL COLOR: Green

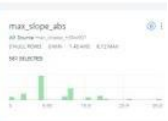
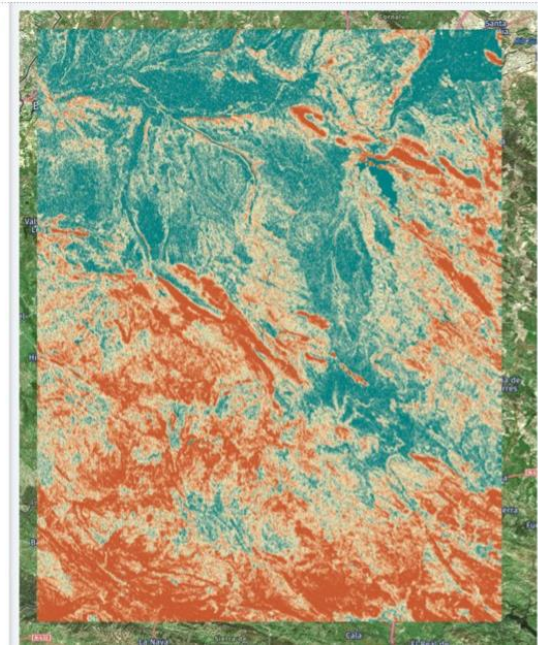


max_slopes_n38w00...
 ADD PEOPLE Unpublished map

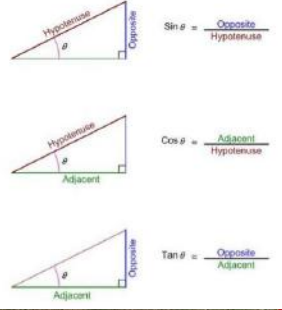
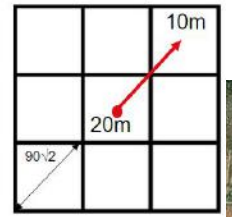
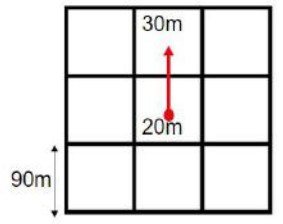
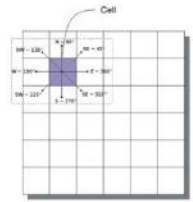
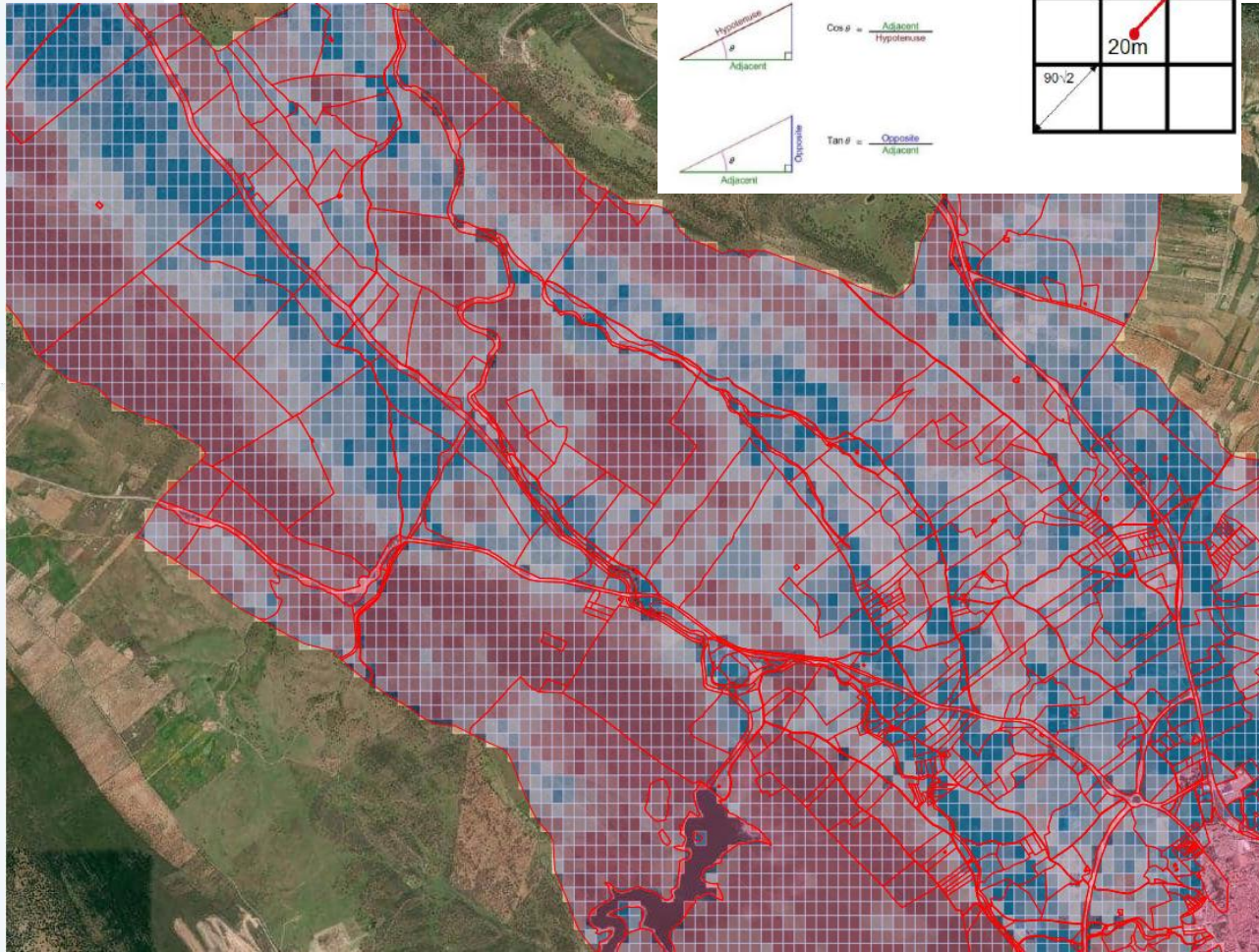
LAYERS (1/10) WIDGETS

ADD NEW WIDGET

max_slope_abs
 All Source max_slope_abs (2007)



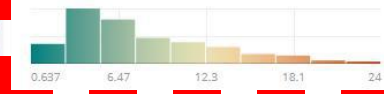
Slope



Wind speed@150m (m/s)
 C0 Source wind_intersection_gpd_zafra
 0 NULL ROWS 0 MIN 6.03 AVG 0 MAX
 610 SELECTED



Absolute max slope (°)
 B0 Source srtm_intersection_gpd_zafra
 0 NULL ROWS 0 MIN 7.95 AVG 0 MAX
 5.3K SELECTED



Cadaster parcel type
 A0 Source table_06_ra_2018_07_20_shf_parcela_zafra
 0% NULL ROWS 54.8% OF TOTAL
 ALL SELECTED

R	604
X	124
D	44

Cadaster parcel area (m2)
 A0 Source table_06_ra_2018_07_20_shf_parcela_zafra

Project Details and Demo

Spatial
Analysis

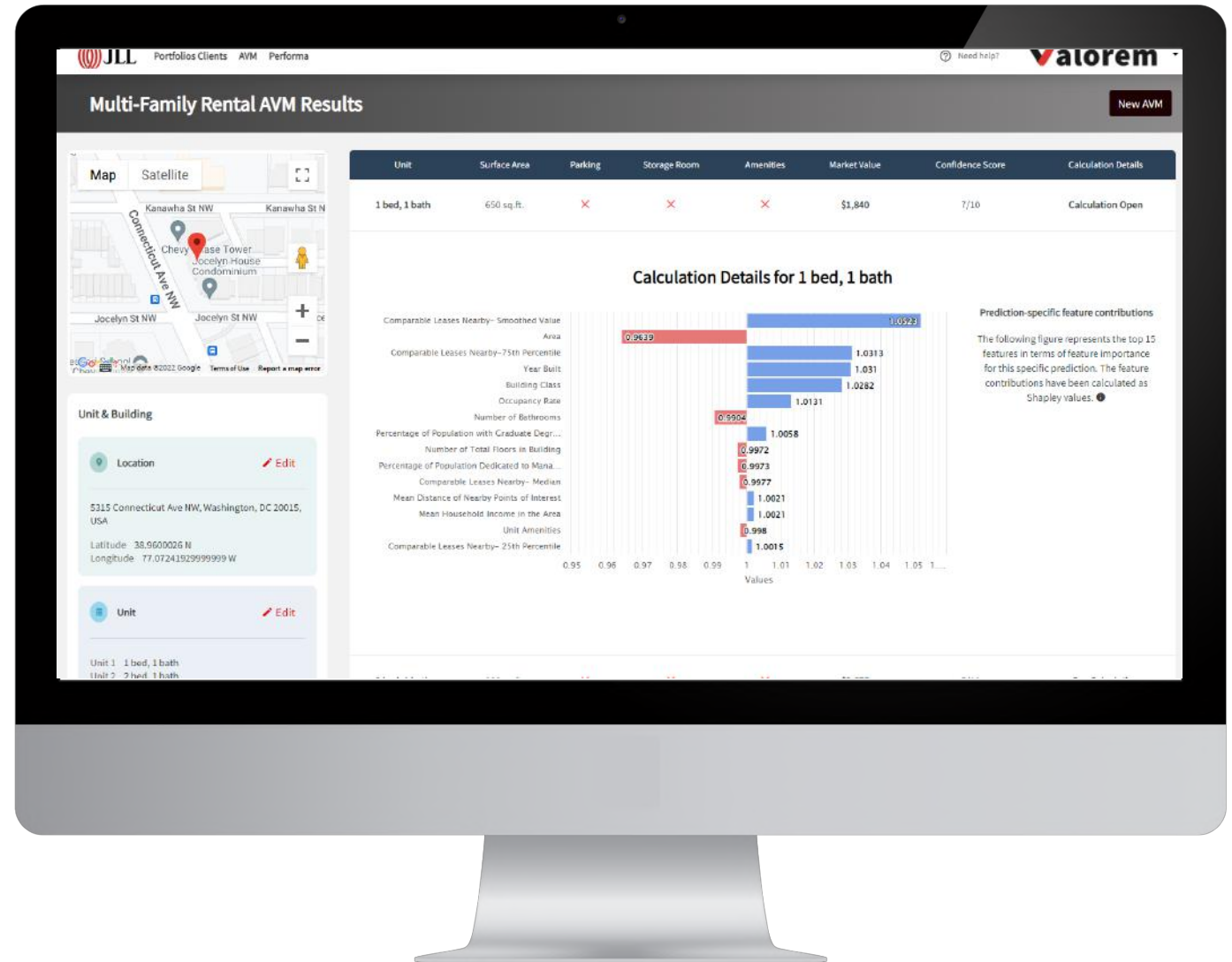
Spatial-
temporal
Modeling

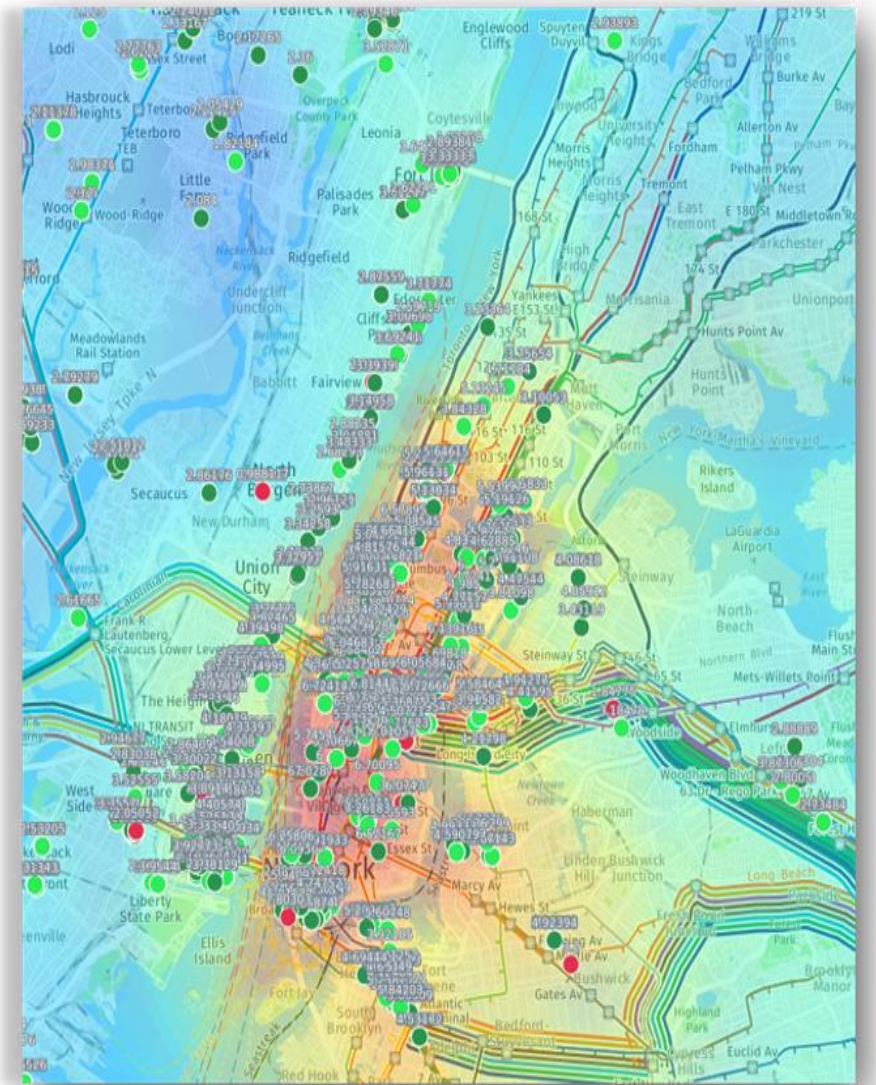
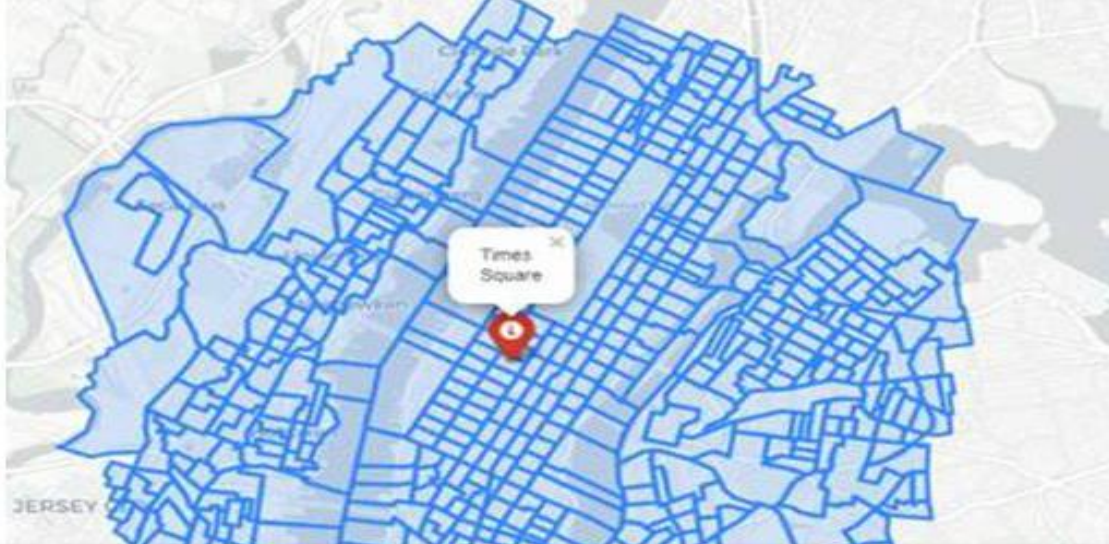
Location
Intelligence

Link LI with
AI+AR

AI Valuation Model

- > Comparables
- > Property Attributes
- > Socioeconomic
- > Demographic
- > POIS

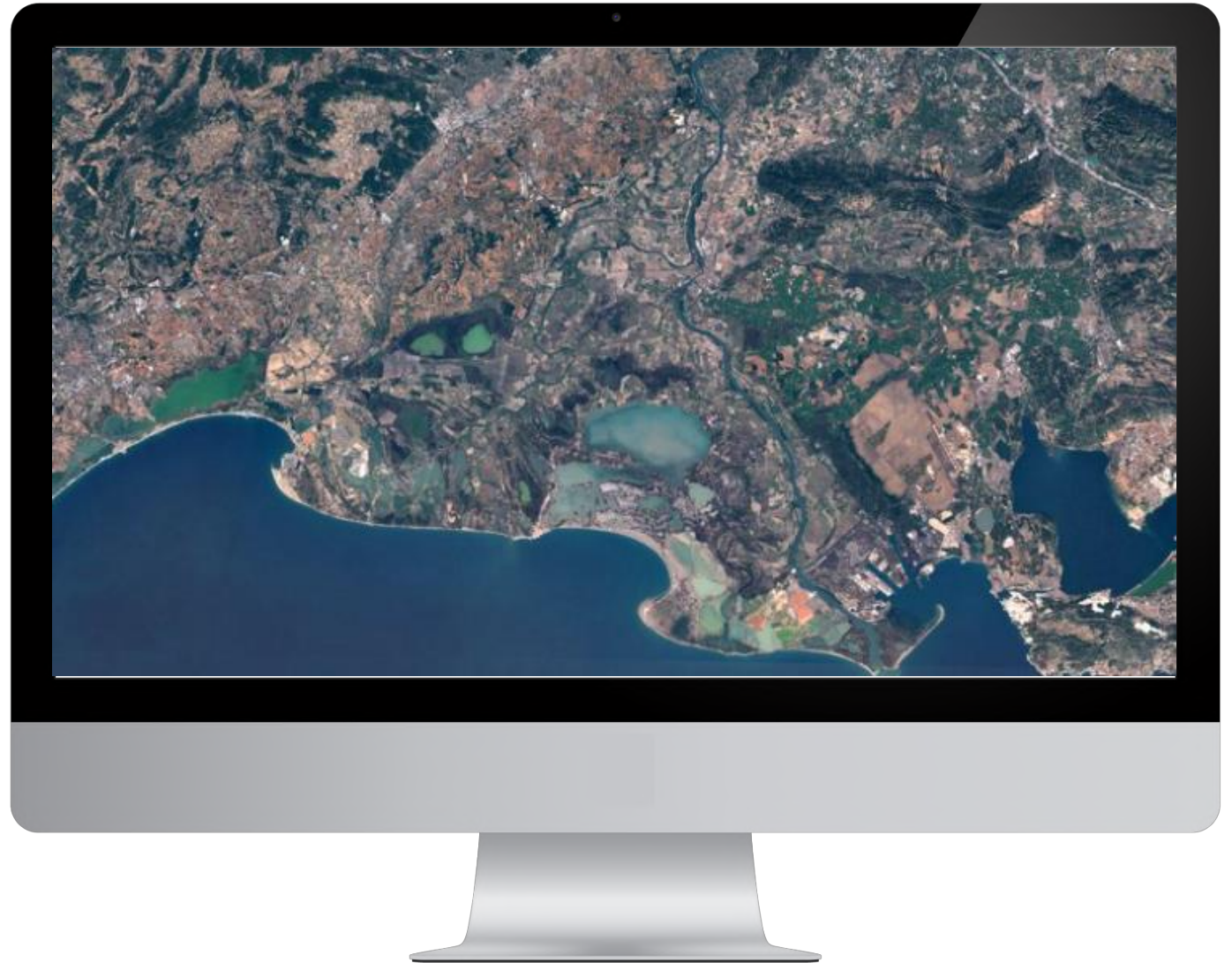




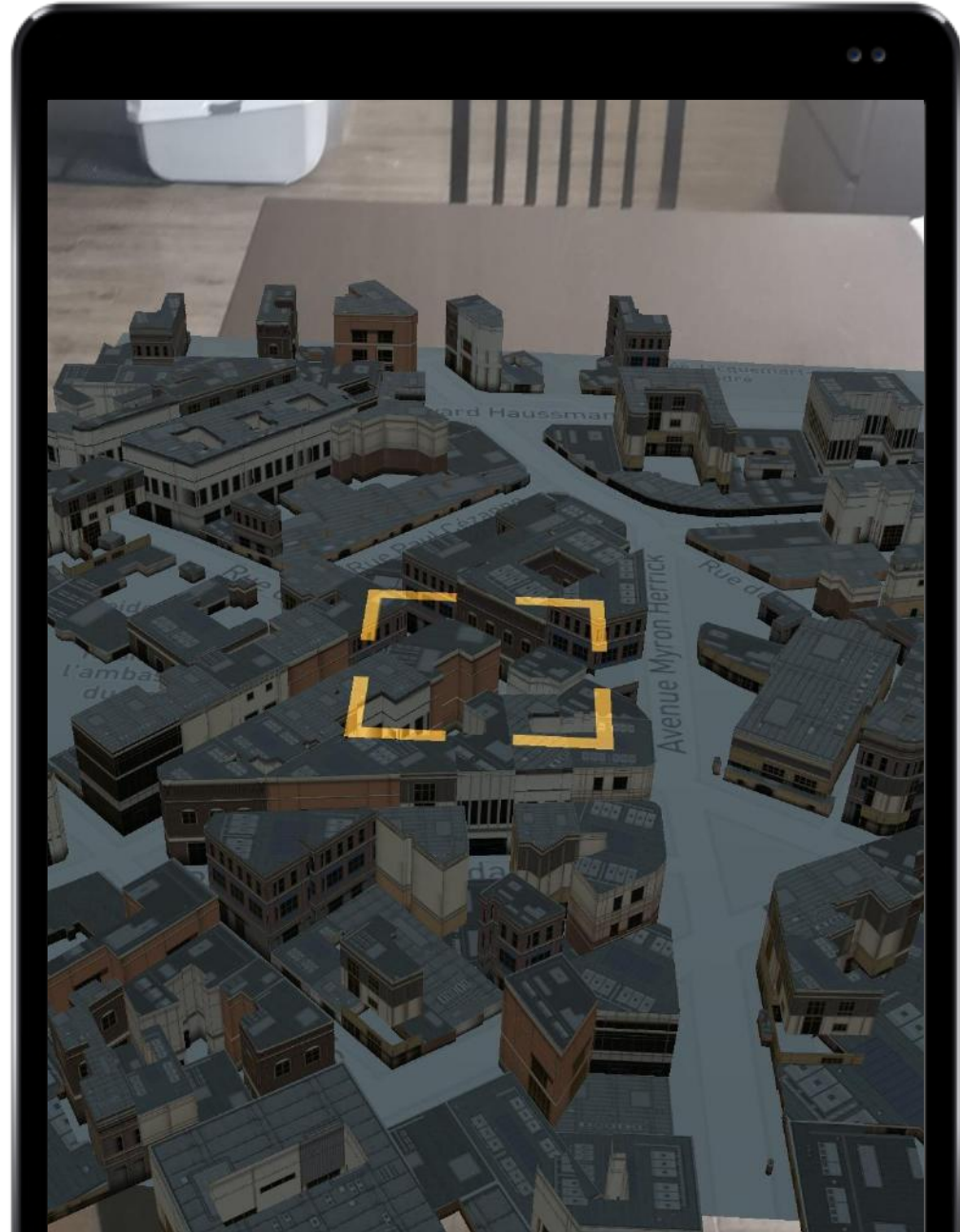
Satellite Image Tagging

> Computer Vision

> Spatial Feature Analysis



AR Location Intelligence



Thankyou!



Yanqing Zeng
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CEO, CARTO