



Kent Larson



Filmoteca Española







**MOBILITY
WITHOUT
CARS**



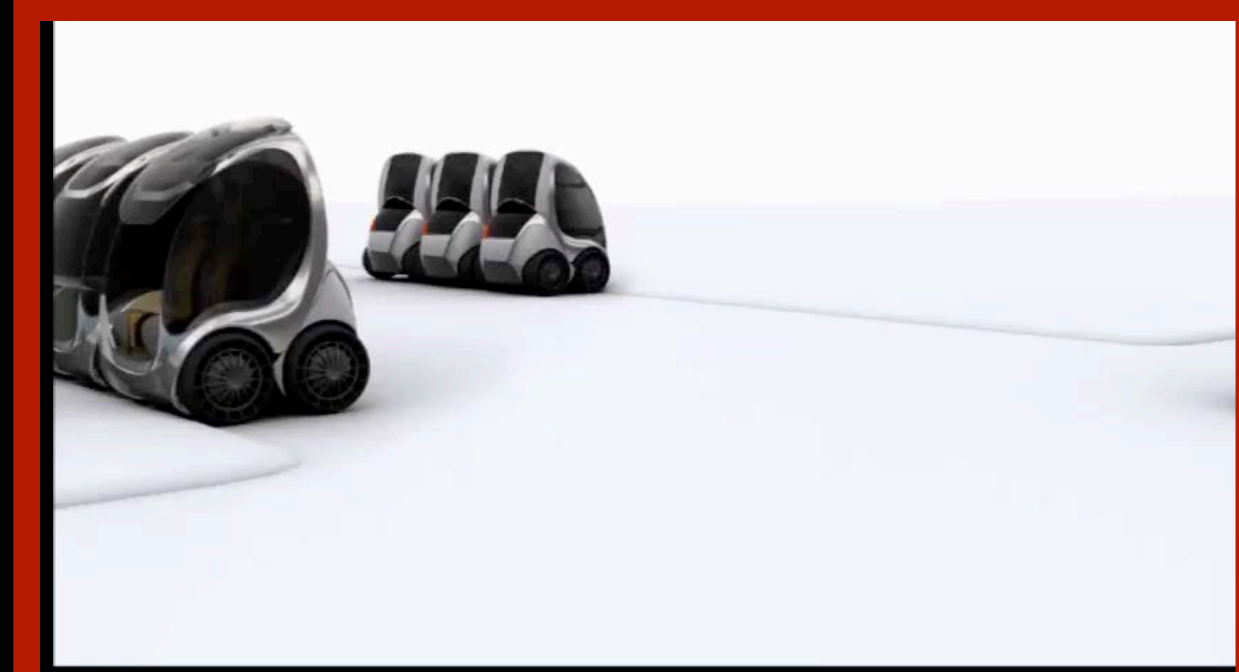
Walking (Privileged Mode)



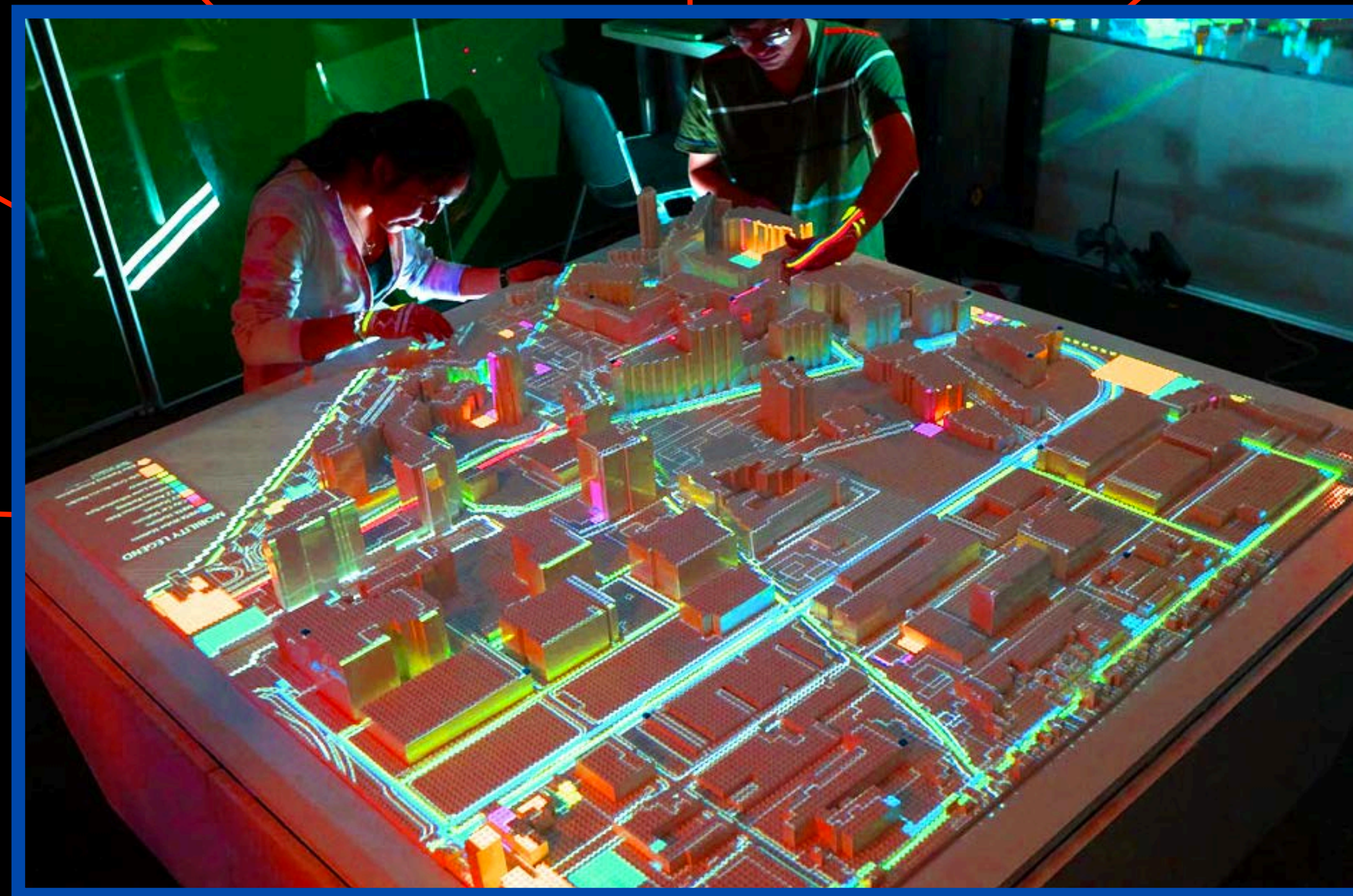
Shared Bikes



Micro-mobility



Autonomous CityCars /Shuttles



3rd Mobility Revolution (a few modes)



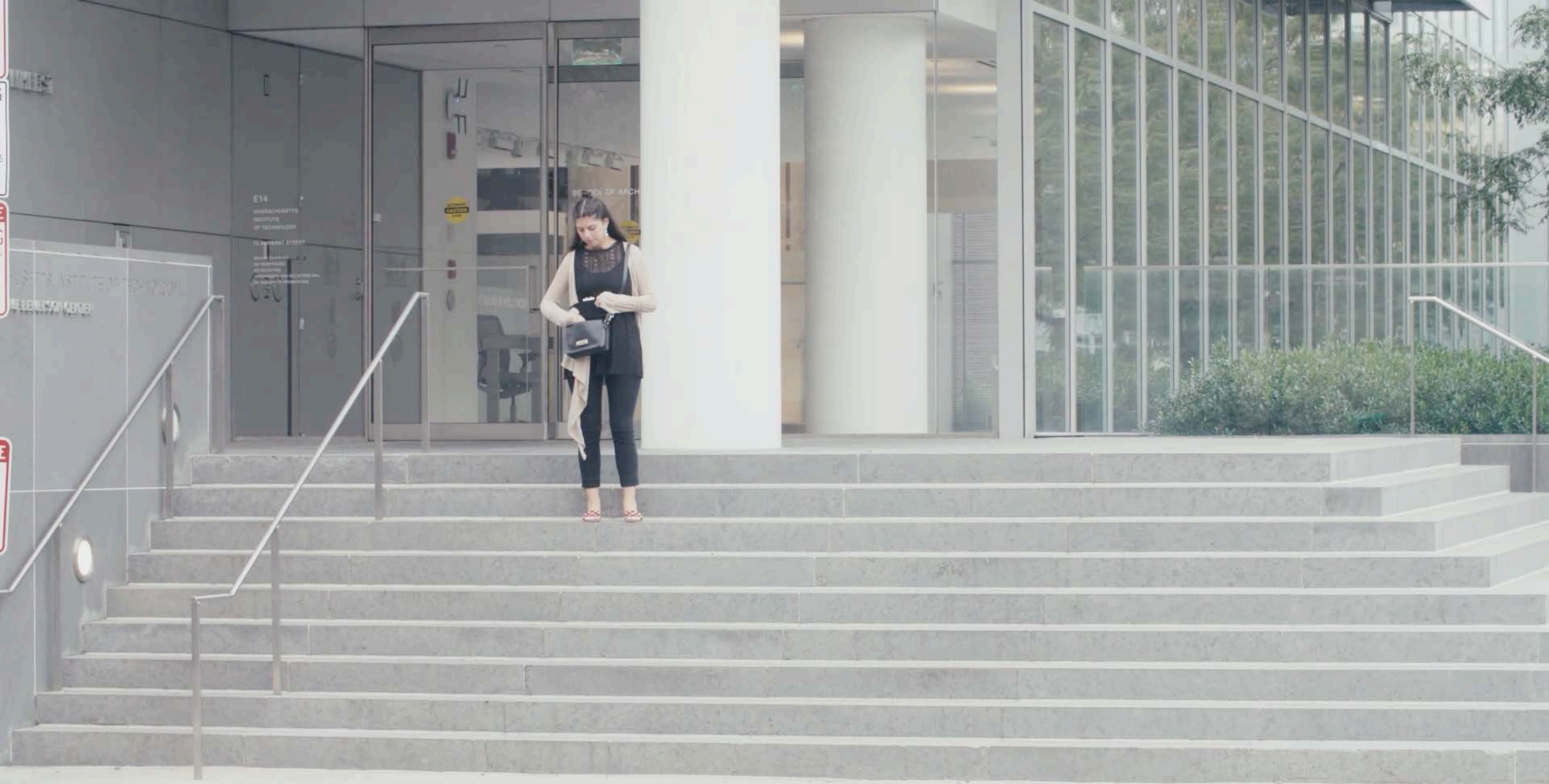
Autonomous Bikes



Shared eScooters



Autonomous 3 Wheelers







city science

MIT Autonomous Bicycle

Naroa Coretti, Michael Lin



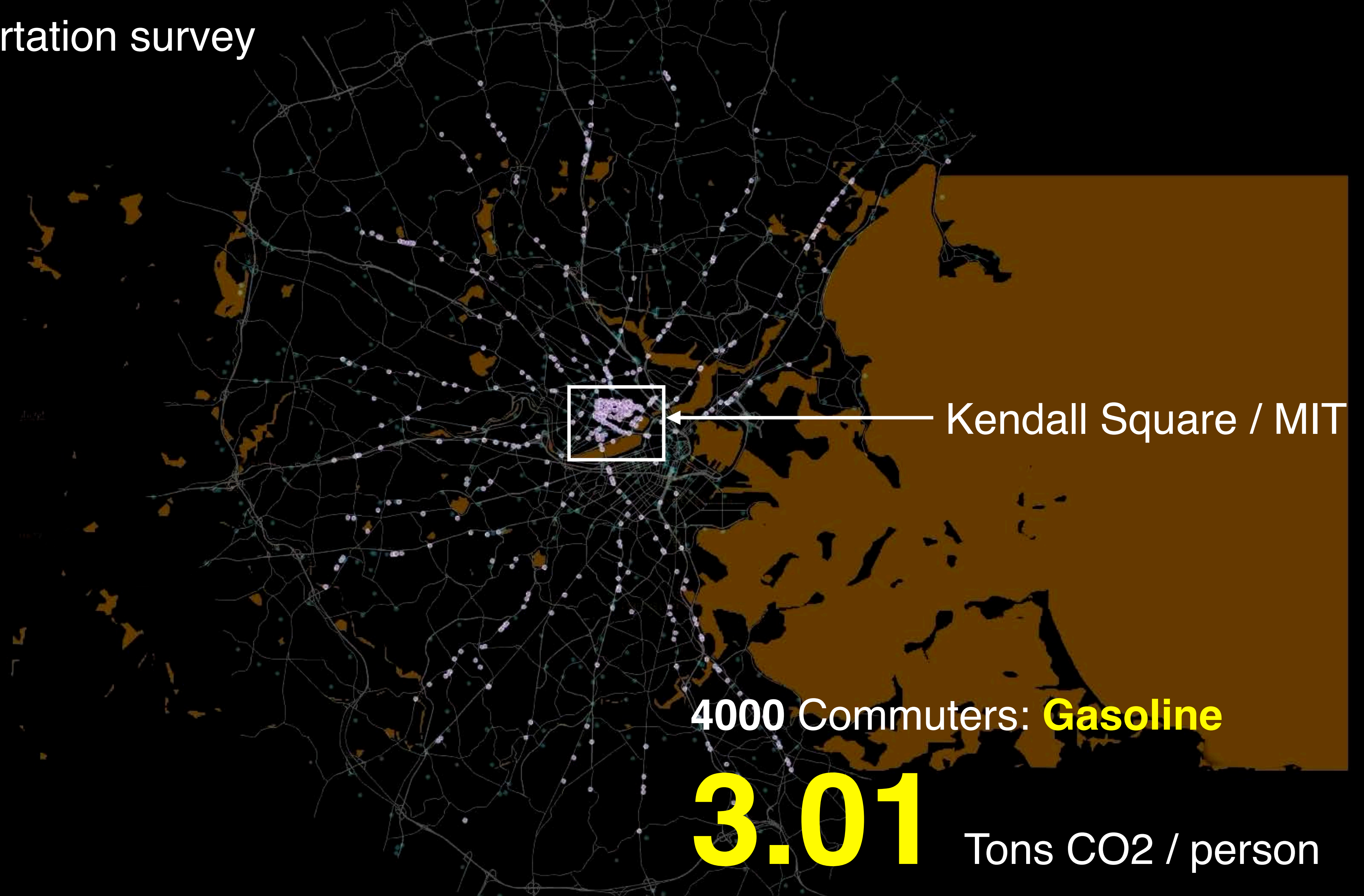
city
science

MIT Autonomous Bicycle

Narora Coretti, Michael Lin



MIT transportation survey

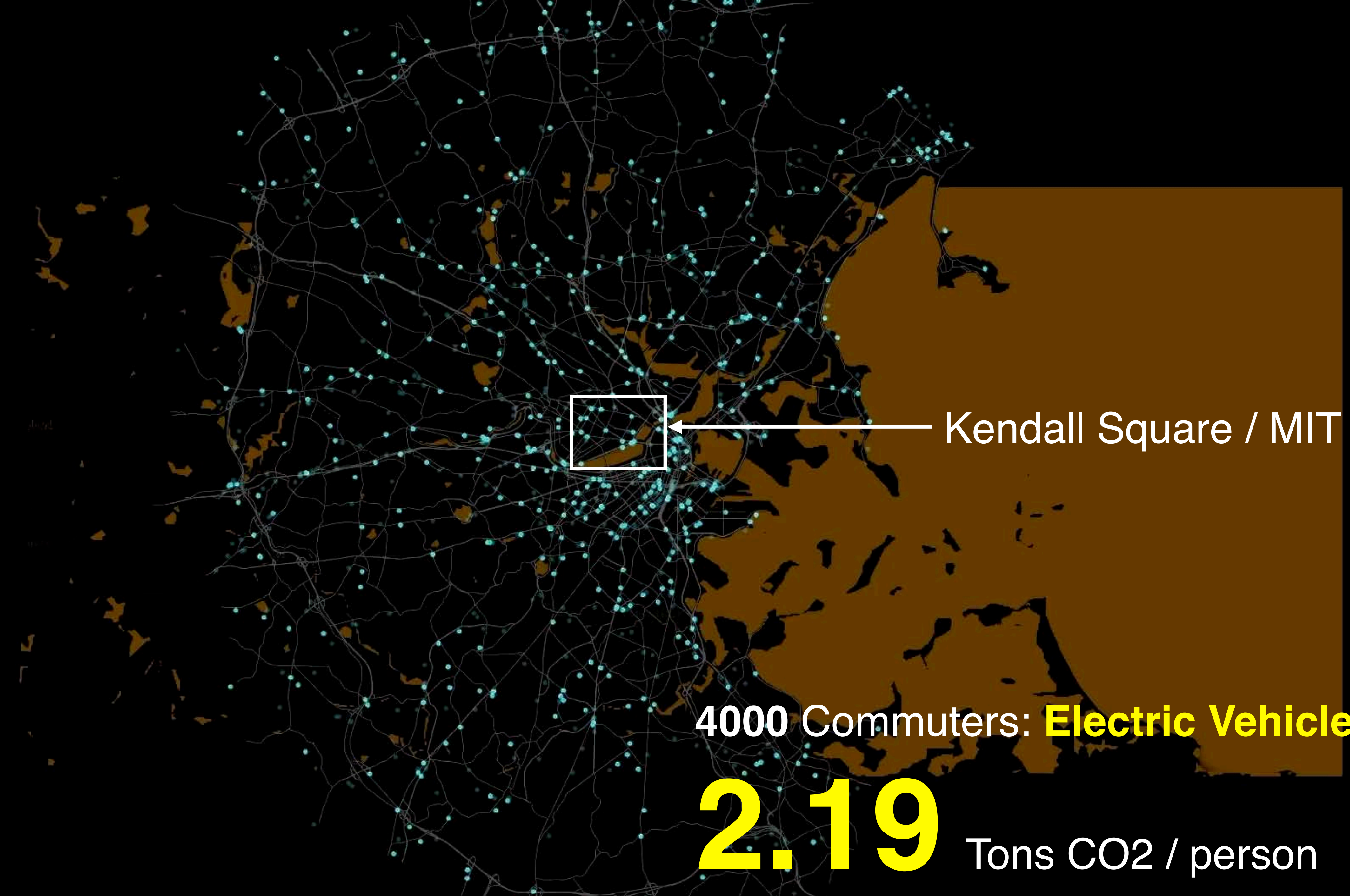


Kendall Square / MIT

4000 Commuters: **Gasoline**

3.01

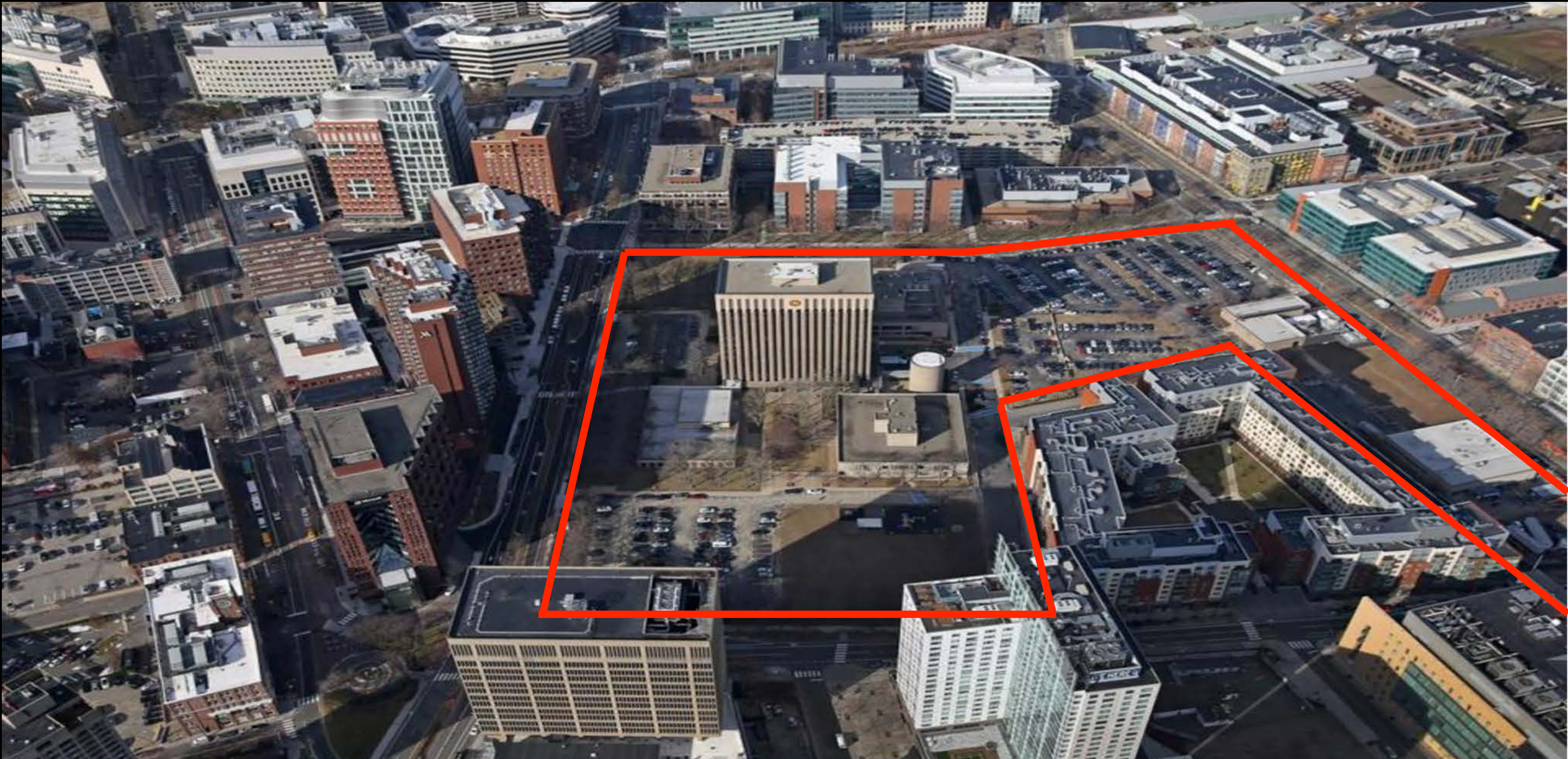
Tons CO₂ / person



Kendall Square / MIT

4000 Commuters: **Electric Vehicles**

2.19 Tons CO2 / person



Kendall Square

Volpe Site

MIT

6X

0 Commuters

0.5

Tons CO2 / person

**HARMONY
WITHOUT
ZONING**

Algorithmic Land Use

Base density:

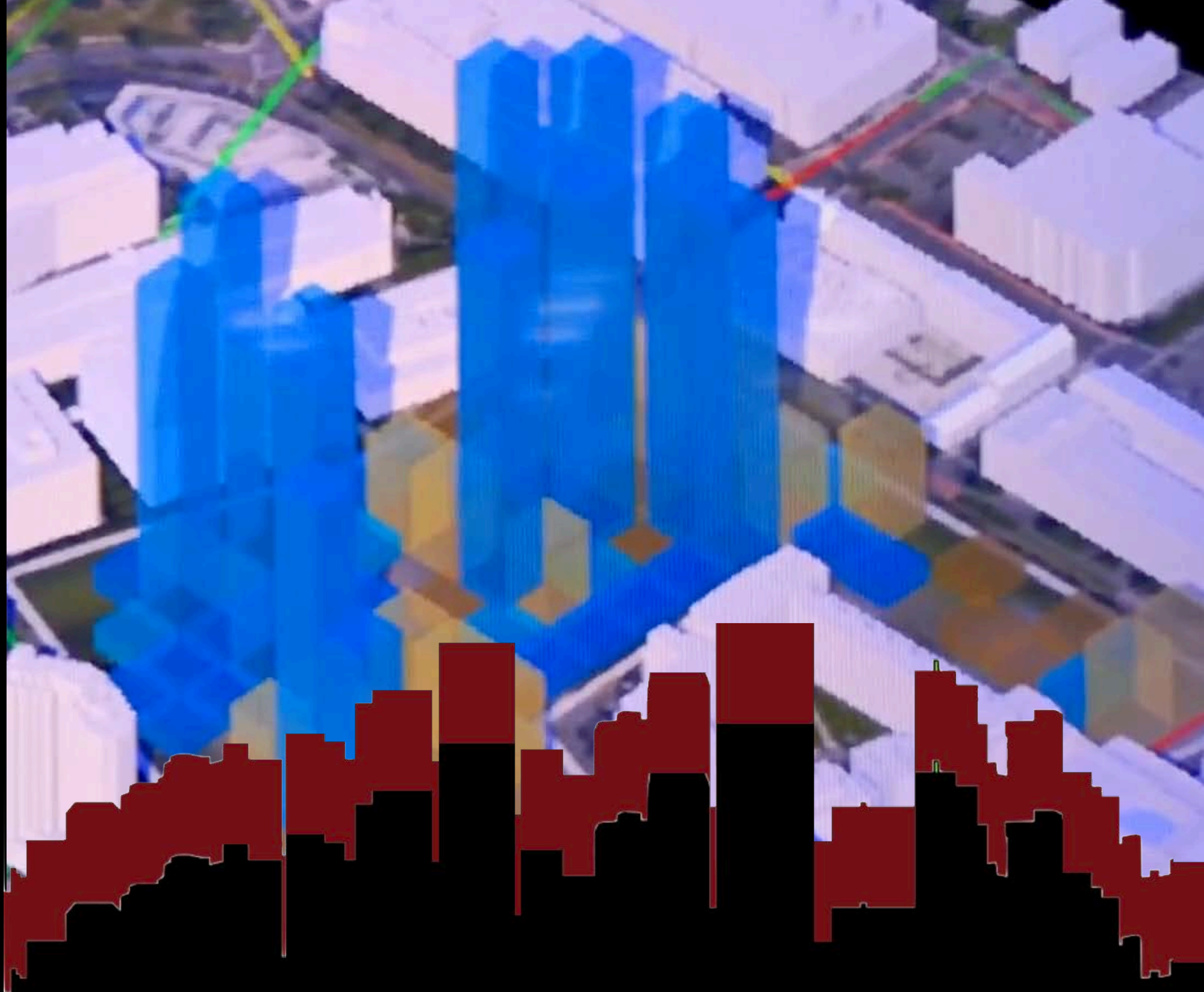
- Luxury Housing
- Research Lab
- Corporate Office



Algorithmic Land Use

Dynamic incentives for
Amenities not supported by the
market:

- Workforce Housing (+20%)
- Family Housing (+22%)
- Senior Housing (+25%)
- Student Housing (+26%)
- Young Prof. Housing (+50%)
- Museum (+28%)
- Grocery store (+32%)
- Pharmacy (+32%)
- Day Care (+36%)
- Community Health Center (+40%)
- ...



Algorithmic Land Use

Civic Homeostasis



Kendall Square Today

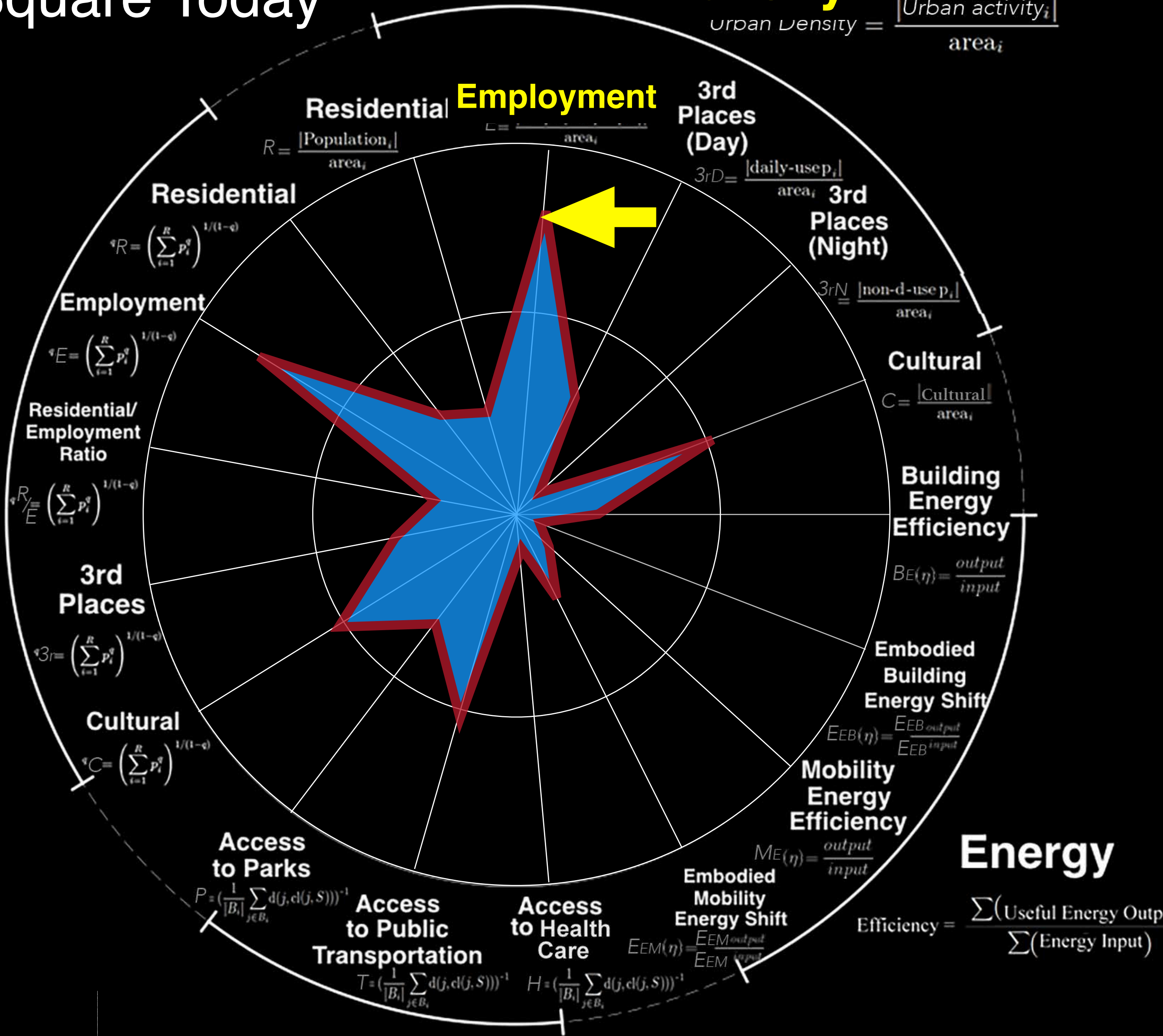
Density

$$\text{Urban Density} = \frac{|\text{Urban activity}_i|}{\text{area}_i}$$

Diversity

$$H' = - \sum_{i=1}^R p_i \ln p_i$$

Shannon index
(Ecosystems)



Proximity

$$\text{closeness to} = \left(\frac{1}{|B_i|} \sum_{j \in B_i} \text{dist}(j, \text{closest}(j, SM)) \right)^{-1}$$

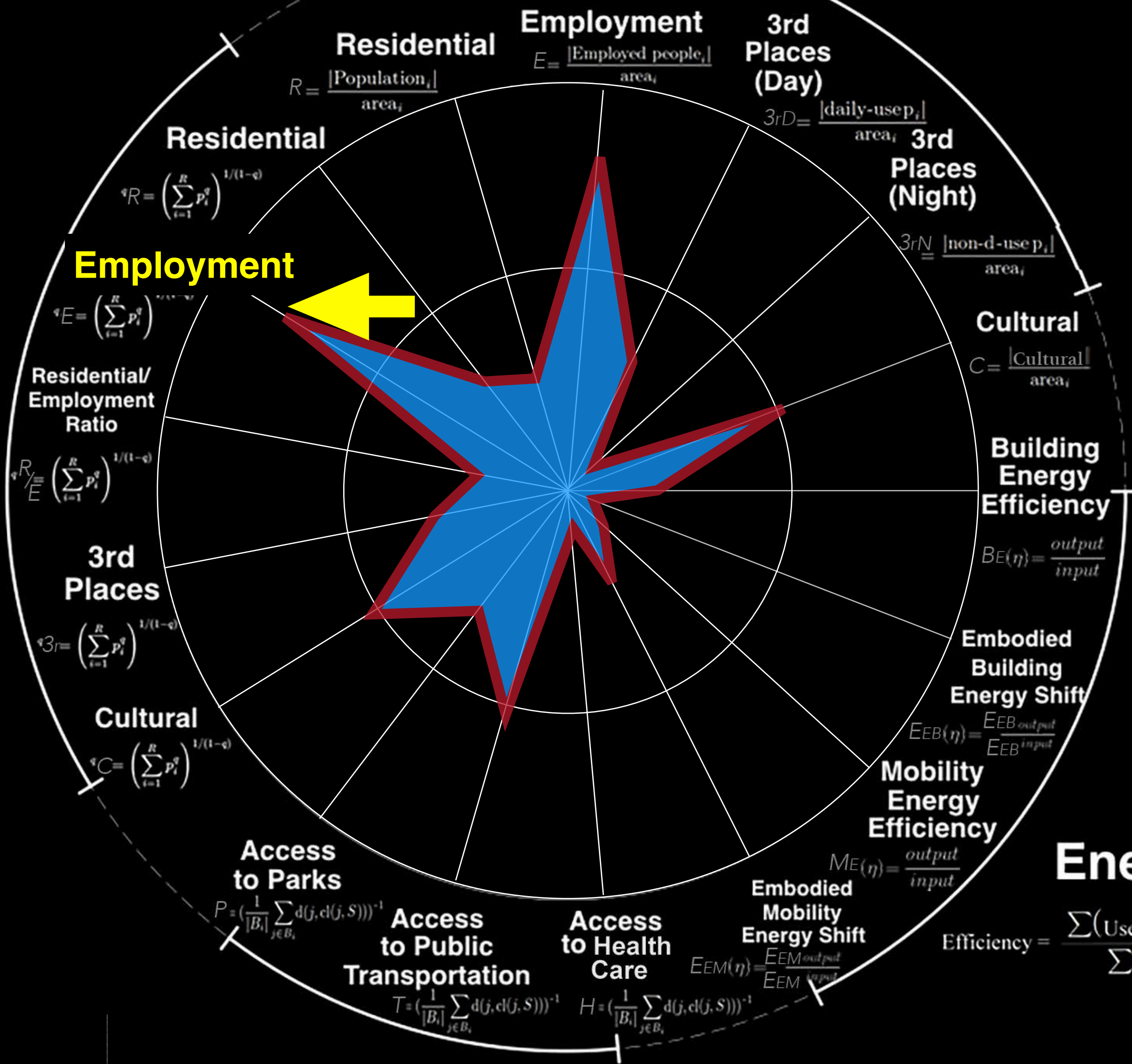
Environmental
Performance

Social
Performance

Kendall Square Today

Density

$$\text{Urban Density} = \frac{|\text{Urban activity}_i|}{\text{area}_i}$$



Diversity

$$H' = - \sum_{i=1}^n p_i \ln p_i$$

Shannon index (Ecosystems)

Environmental Performance

Social Performance



Proximity

$$\text{closeness to} = \left(\frac{1}{|B_i|} \sum_{j \in B_i} \text{dist}(j, \text{closest}(j, SM)) \right)^{-1}$$

Kendall Square Today

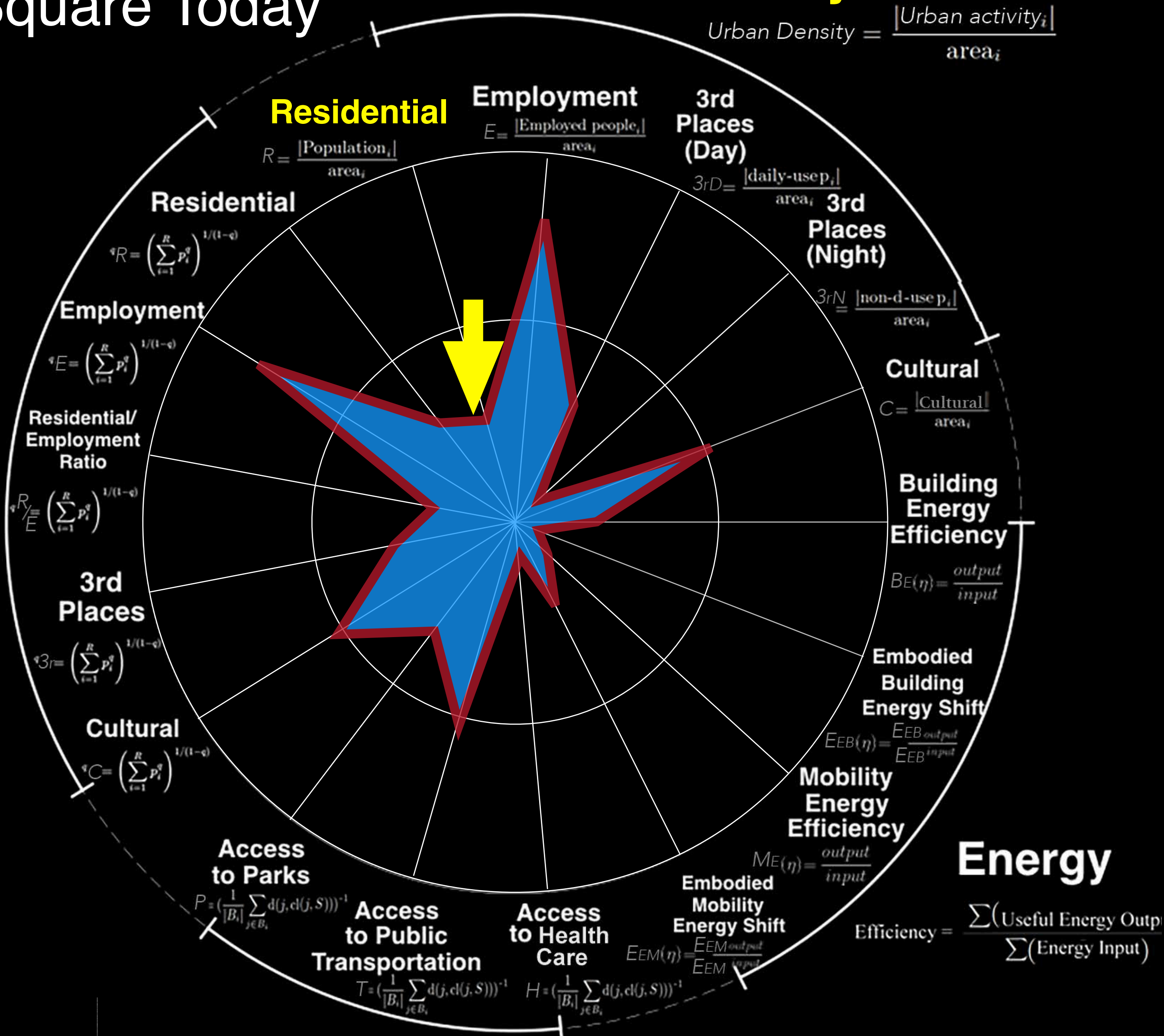
Density

$$\text{Urban Density} = \frac{|\text{Urban activity}_i|}{\text{area}_i}$$

Diversity

$$H' = - \sum_{i=1}^R p_i \ln p_i$$

Shannon index
(Ecosystems)



Environmental Performance

Social Performance



Kendall Square Today

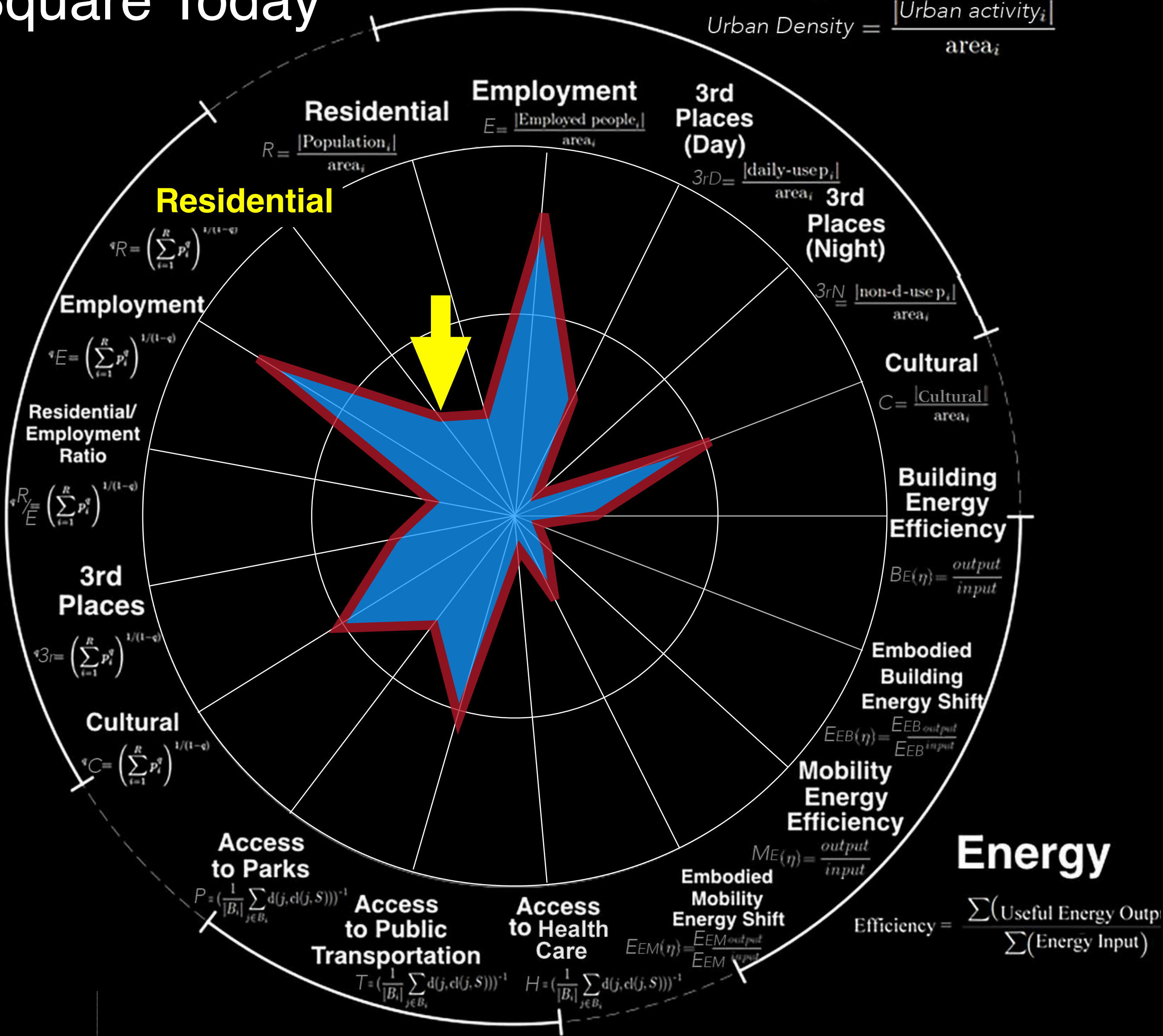
Density

$$\text{Urban Density} = \frac{|\text{Urban activity}_i|}{\text{area}_i}$$

Diversity

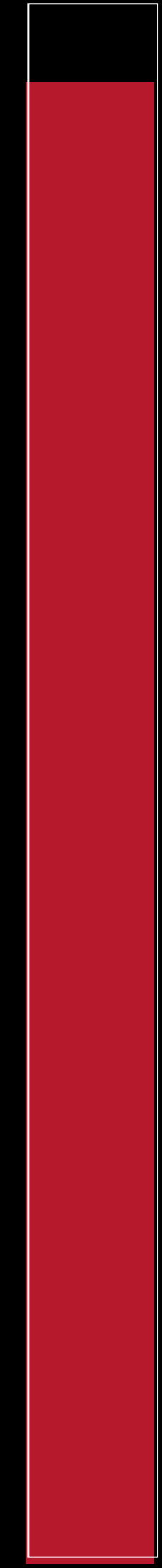
$$H' = - \sum_{i=1}^R p_i \ln p_i$$

Shannon index
(Ecosystems)

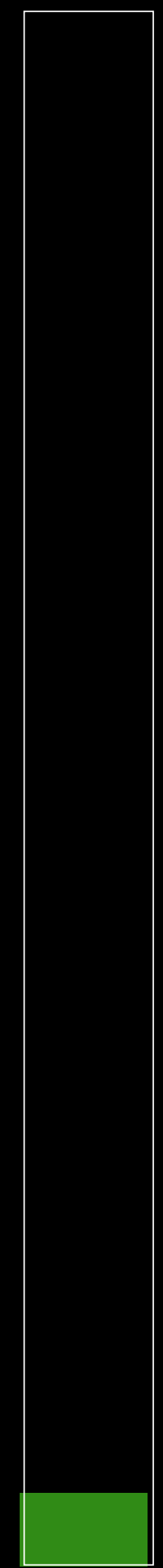


Proximity

$$\text{closeness to} = \left(\frac{1}{|B_i|} \sum_{j \in B_i} \text{dist}(j, \text{closest}(j, SM)) \right)^{-1}$$



Environmental Performance



Social Performance



Kendall Square Today

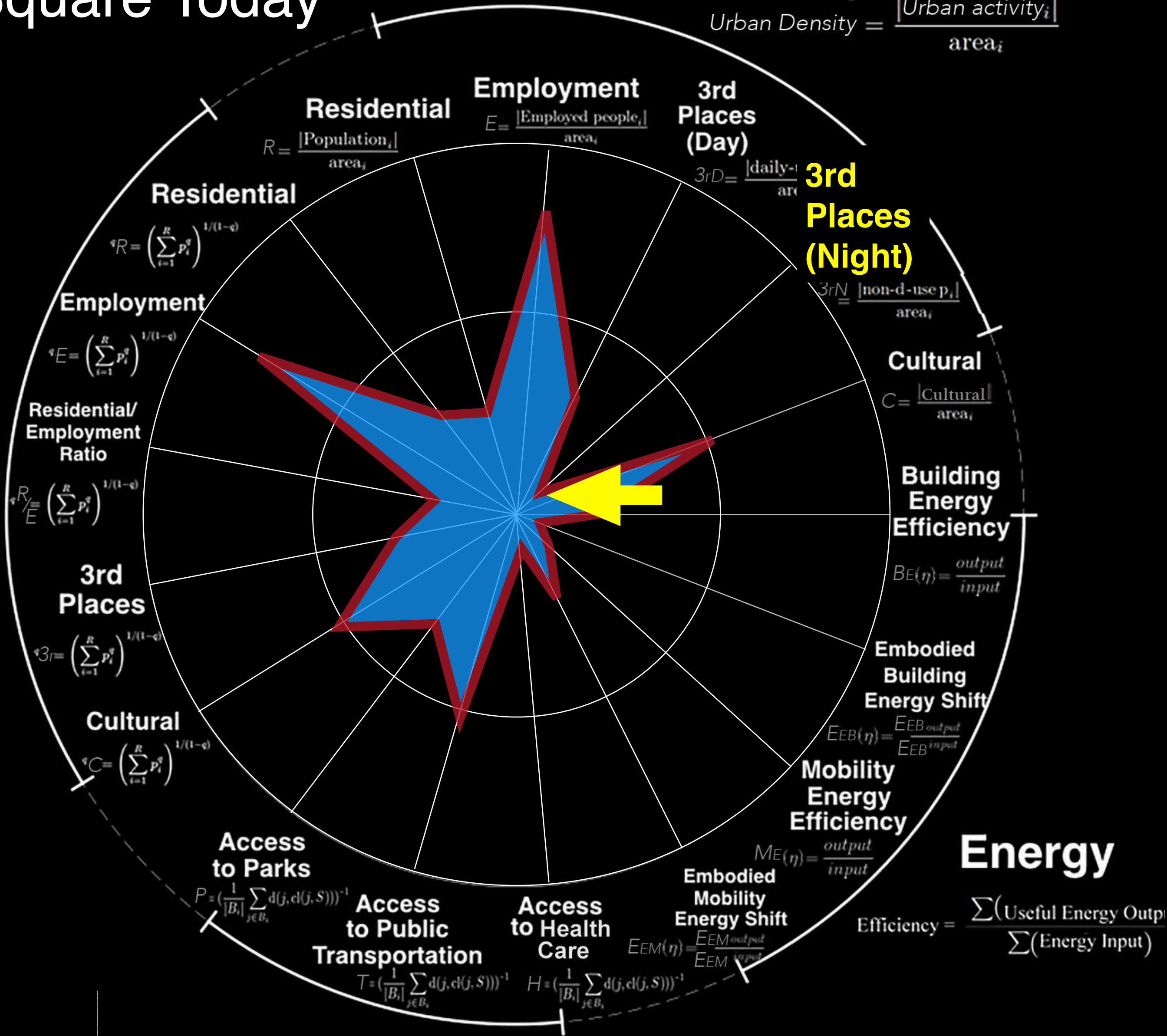
Density

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Diversity

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Shannon index
(Ecosystems)



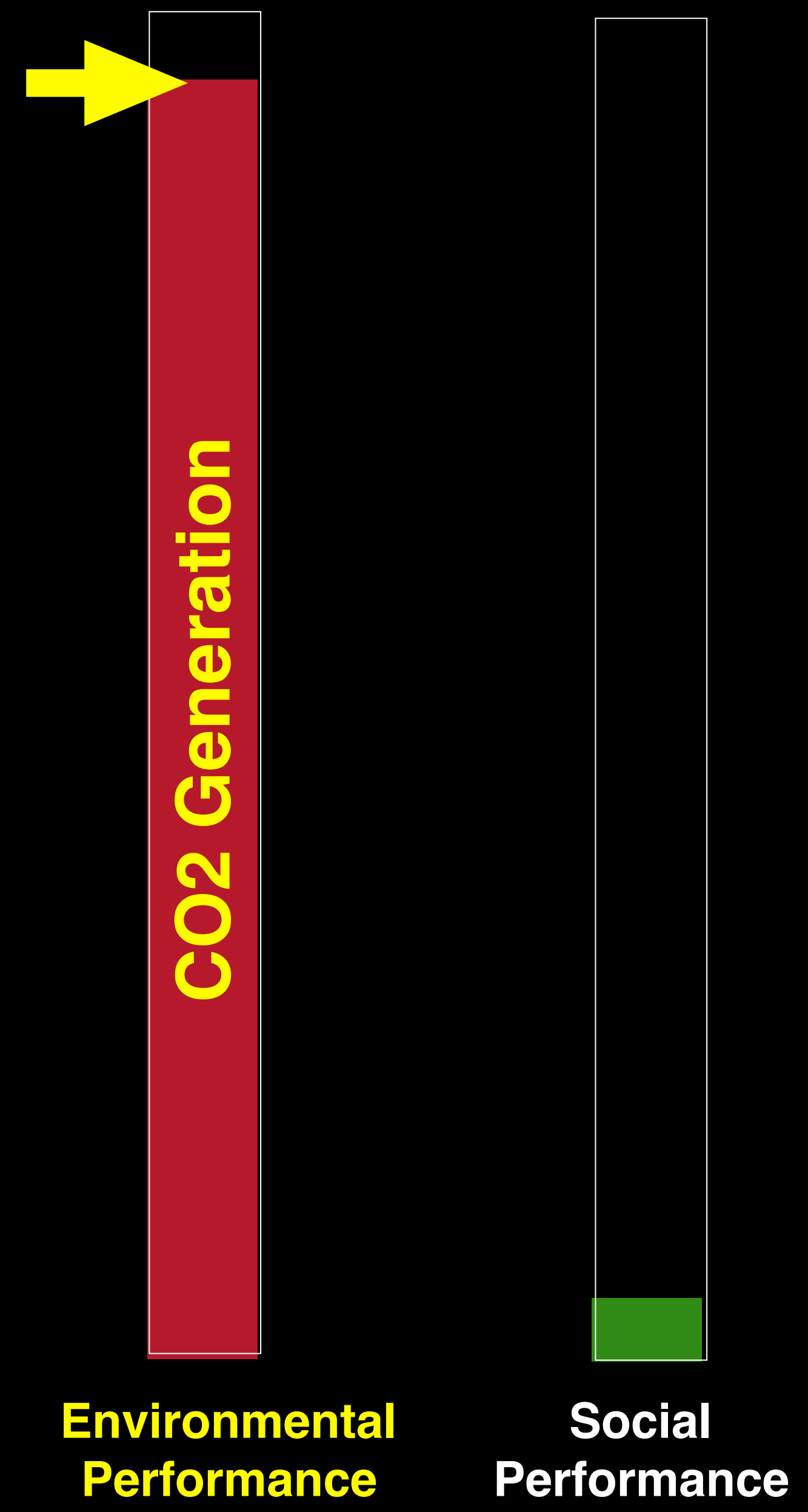
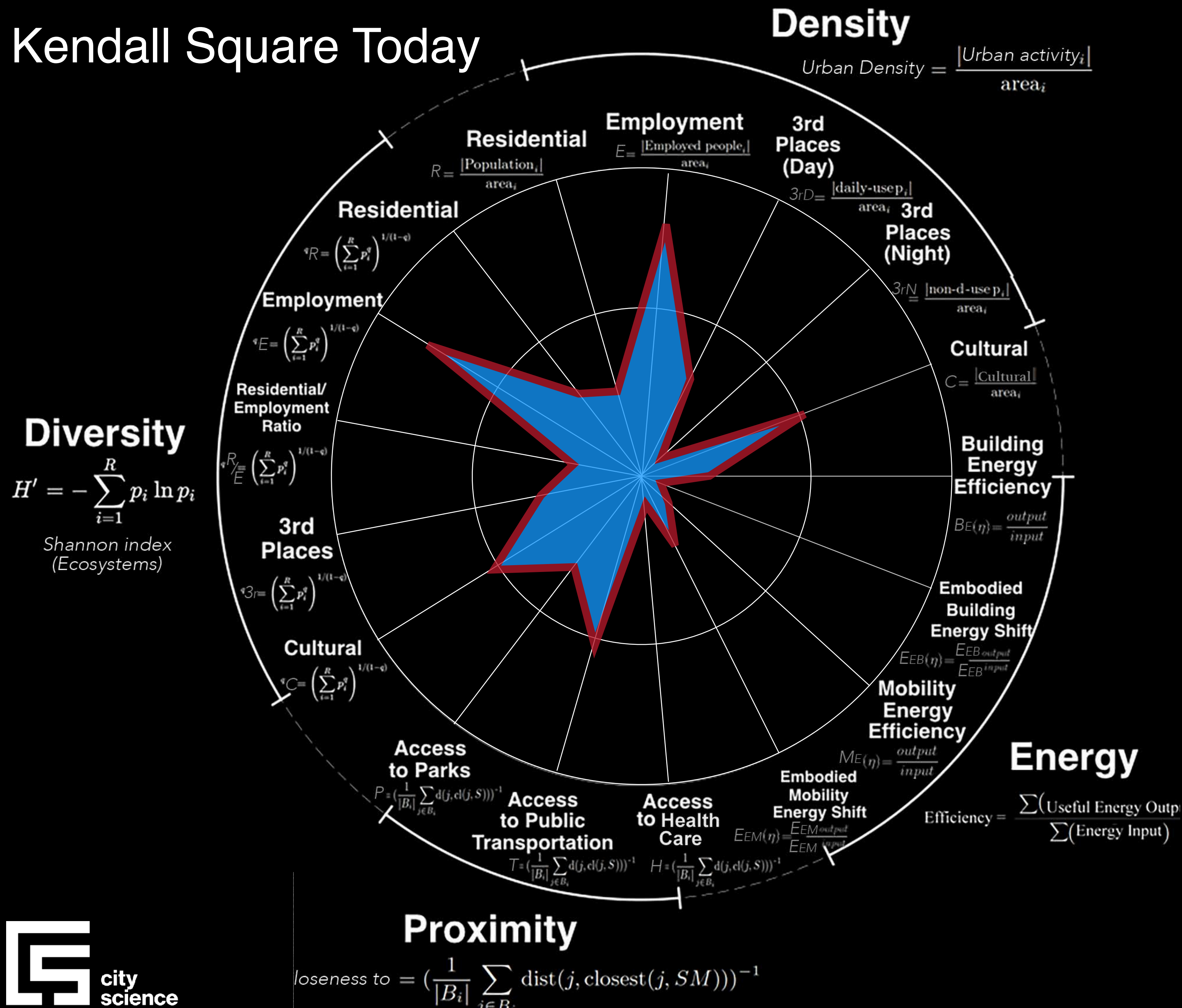
Proximity

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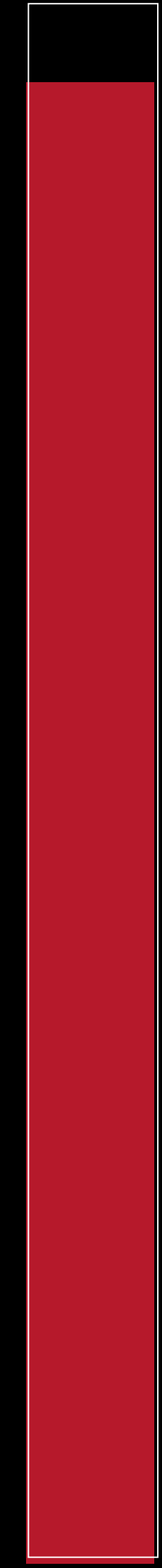
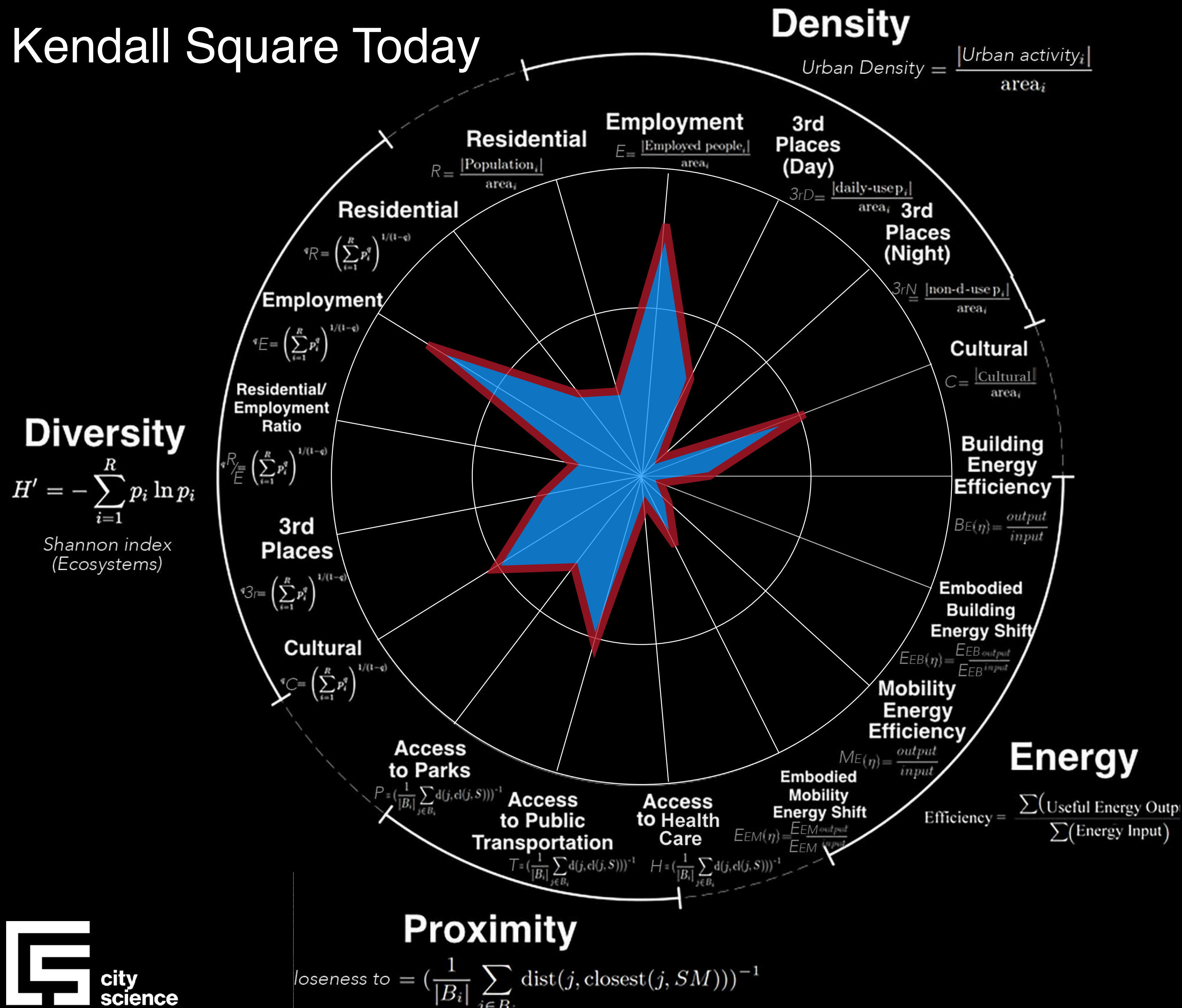
Environmental
Performance

Social
Performance

Kendall Square Today



Kendall Square Today



Environmental Performance

Social Performance

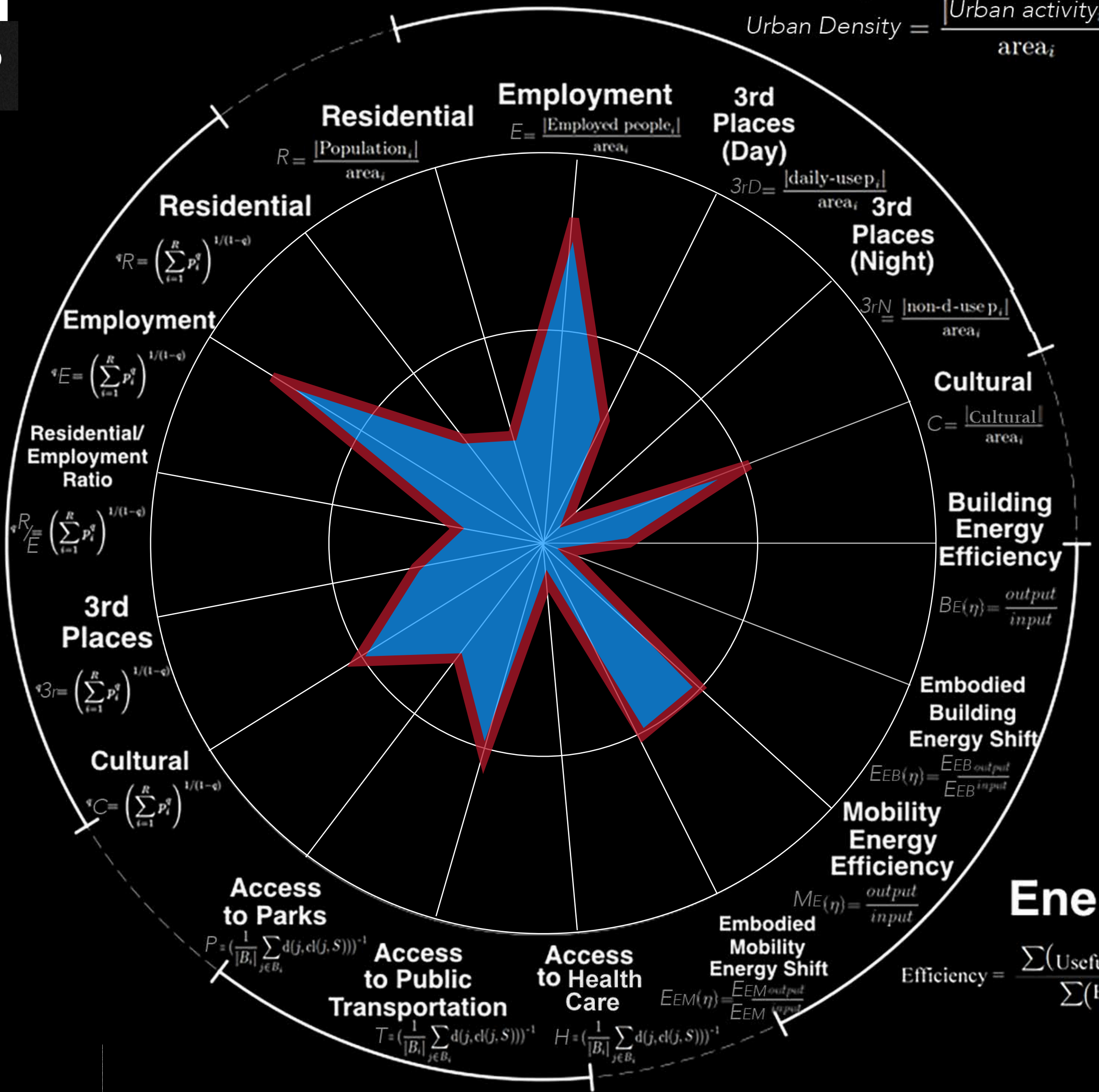
Innovation / Wellness / Security



MOBILITY WITHOUT CARS

Density

$$\text{Urban Density} = \frac{|\text{Urban activity}_i|}{\text{area}_i}$$



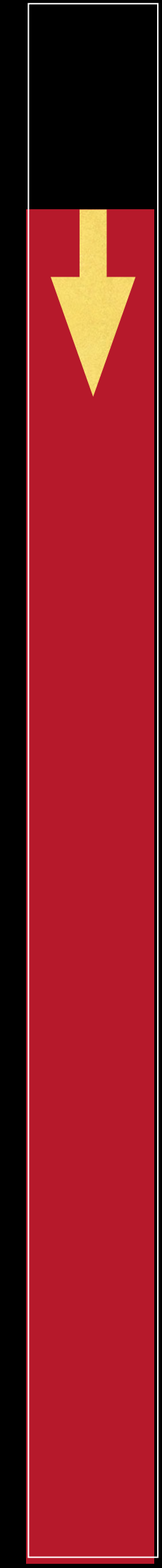
Diversity

$$H' = - \sum_{i=1}^R p_i \ln p_i$$

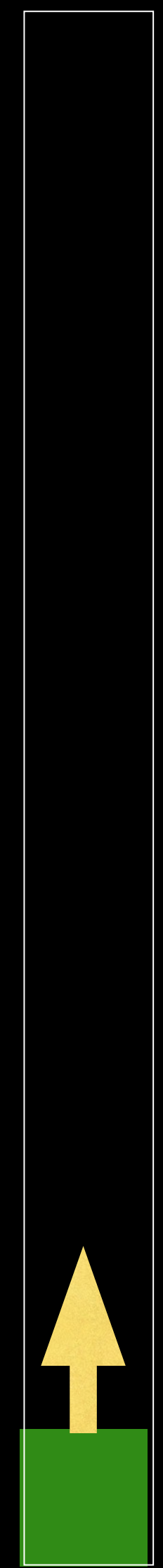
Shannon index (Ecosystems)

Energy

$$\text{Efficiency} = \frac{\sum(\text{Useful Energy Output})}{\sum(\text{Energy Input})}$$



CO2 Generation



Social Performance

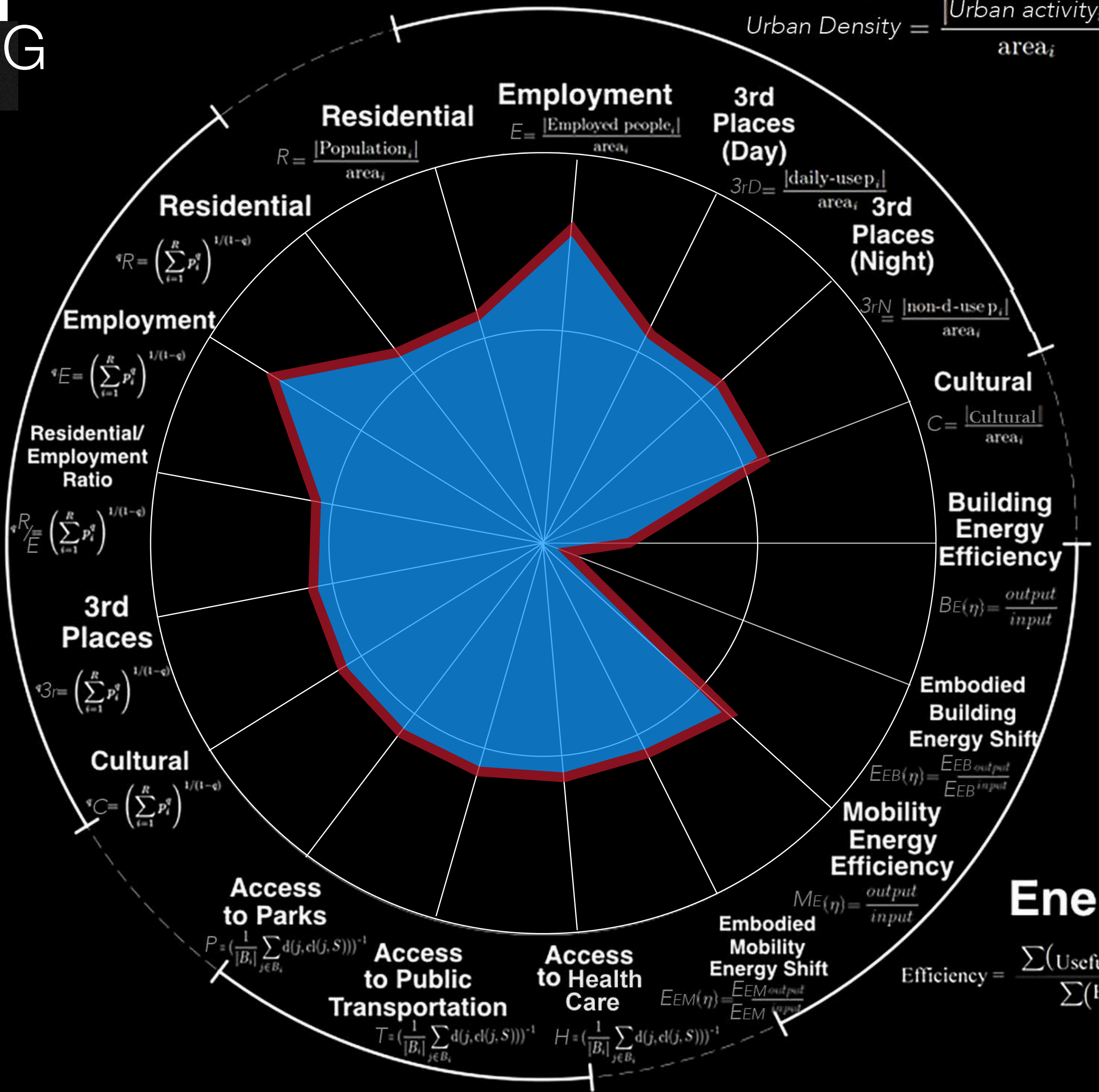
Proximity

$$\text{closeness to} = \left(\frac{1}{|B_i|} \sum_{j \in B_i} \text{dist}(j, \text{closest}(j, SM)) \right)^{-1}$$

HARMONY WITHOUT ZONING

Density

$$\text{Urban Density} = \frac{|\text{Urban activity}_i|}{\text{area}_i}$$



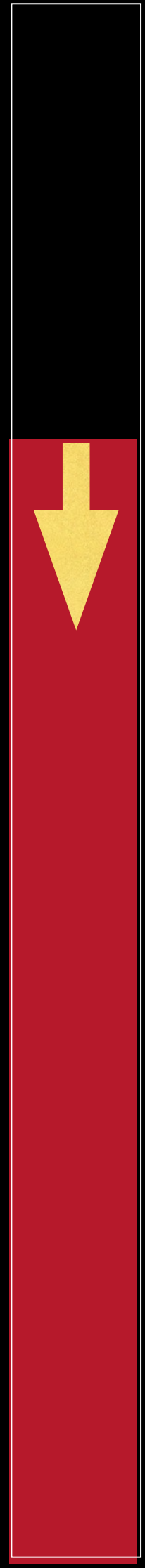
Diversity

$$H' = - \sum_{i=1}^R p_i \ln p_i$$

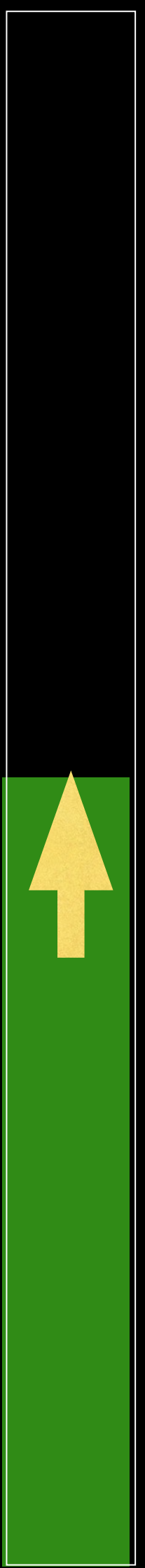
Shannon index (Ecosystems)

Energy

$$\text{Efficiency} = \frac{\sum(\text{Useful Energy Outp})}{\sum(\text{Energy Input})}$$



CO2 Generation



Social Performance

Proximity

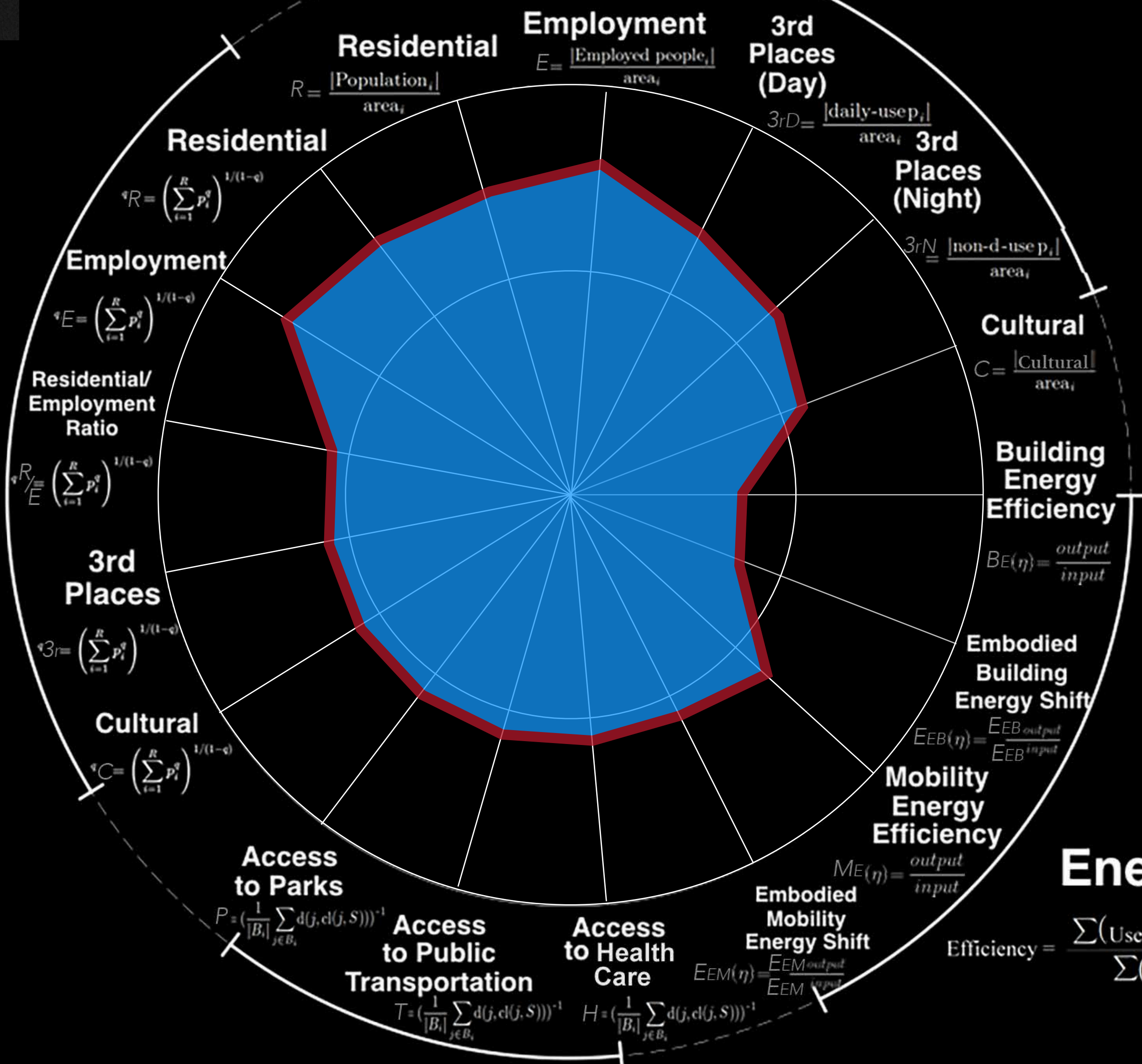
$$\text{Closeness to} = \left(\frac{1}{|B_i|} \sum_{j \in B_i} \text{dist}(j, \text{closest}(j, SM)) \right)^{-1}$$



HOUSING WITHOUT ROOMS

Density

$$\text{Urban Density} = \frac{|\text{Urban activity}_i|}{\text{area}_i}$$



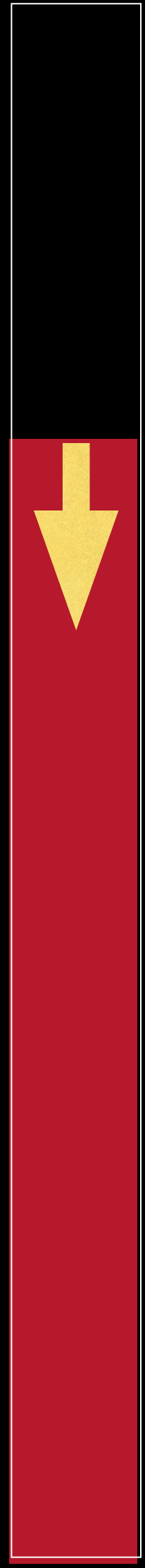
Diversity

$$H' = - \sum_{i=1}^R p_i \ln p_i$$

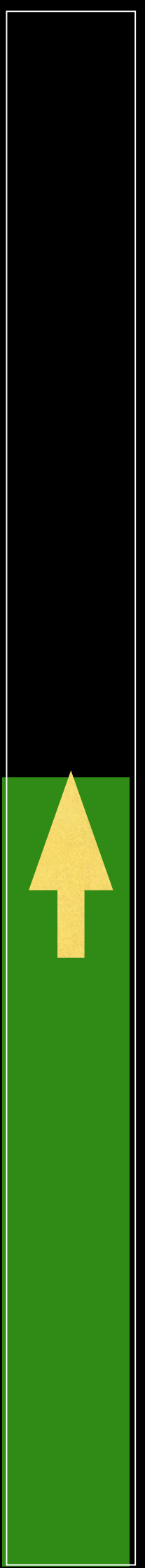
Shannon index (Ecosystems)

Energy

$$\text{Efficiency} = \frac{\sum(\text{Useful Energy Outp})}{\sum(\text{Energy Input})}$$



CO2 Generation



Social Performance

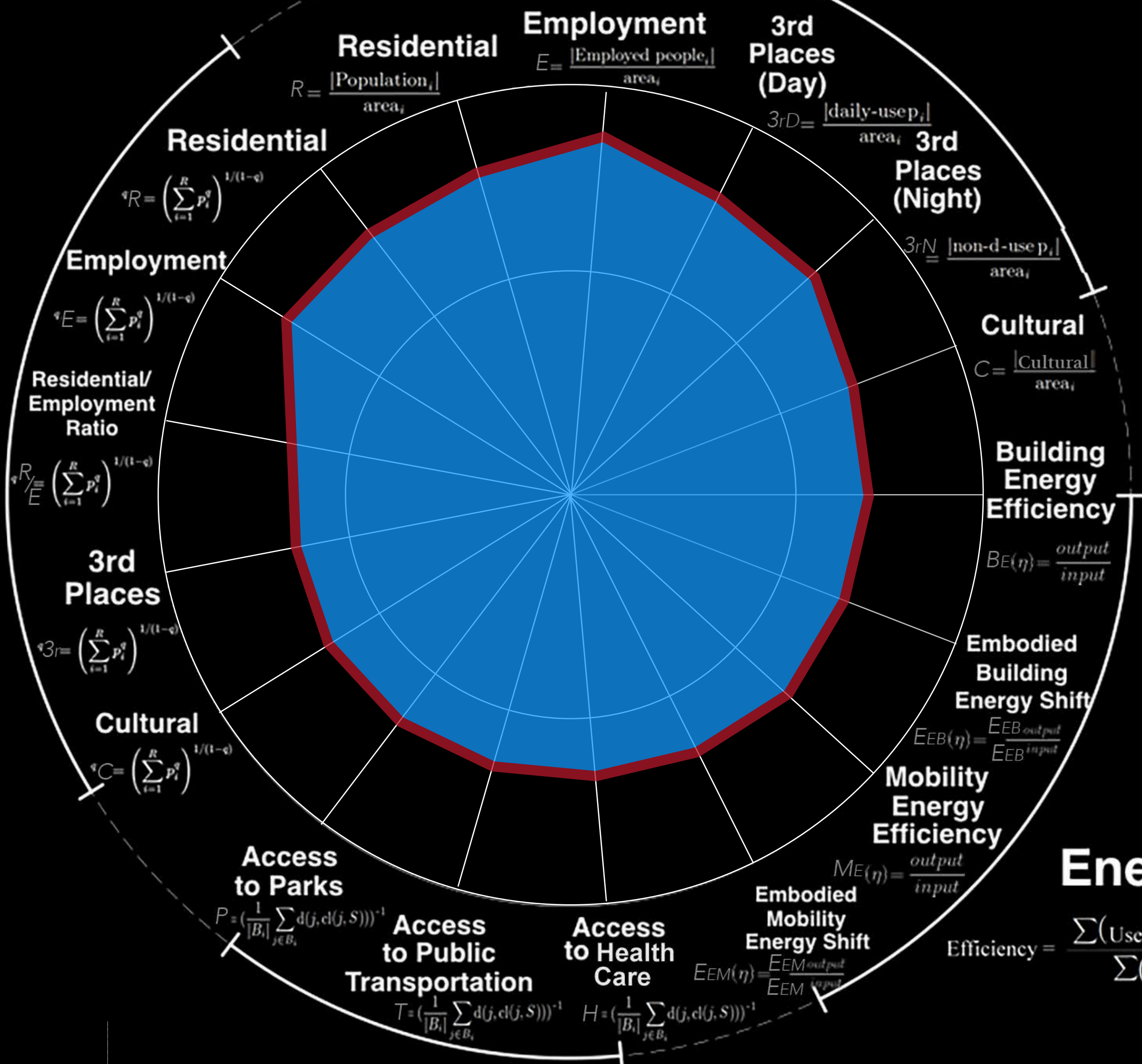
Proximity

$$\text{Closeness to} = \left(\frac{1}{|B_i|} \sum_{j \in B_i} \text{dist}(j, \text{closest}(j, SM)) \right)^{-1}$$

ACCESS WITHOUT OWNERSHIP

Density

$$\text{Urban Density} = \frac{|\text{Urban activity}_i|}{\text{area}_i}$$



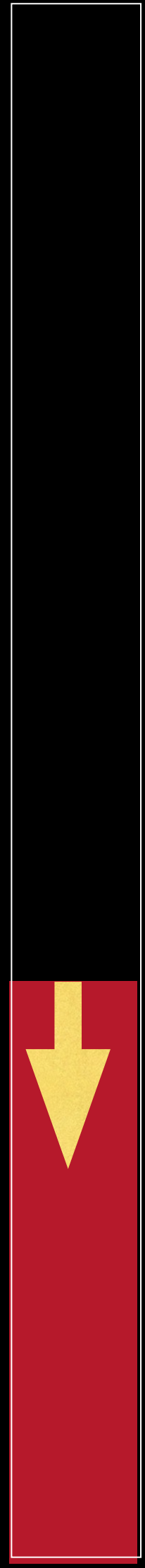
Diversity

$$H' = - \sum_{i=1}^R p_i \ln p_i$$

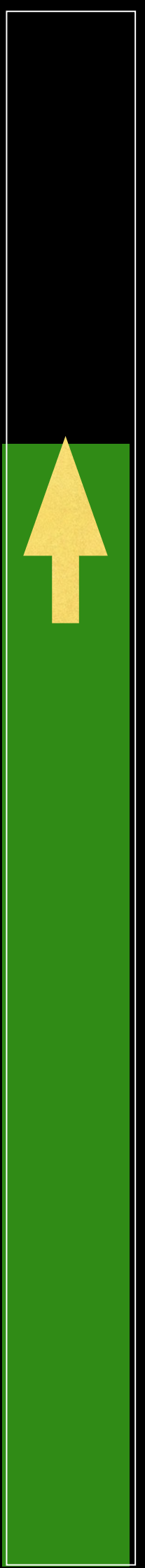
Shannon index (Ecosystems)

Energy

$$\text{Efficiency} = \frac{\sum(\text{Useful Energy Output})}{\sum(\text{Energy Input})}$$



CO2 Generation



Social Performance

Proximity

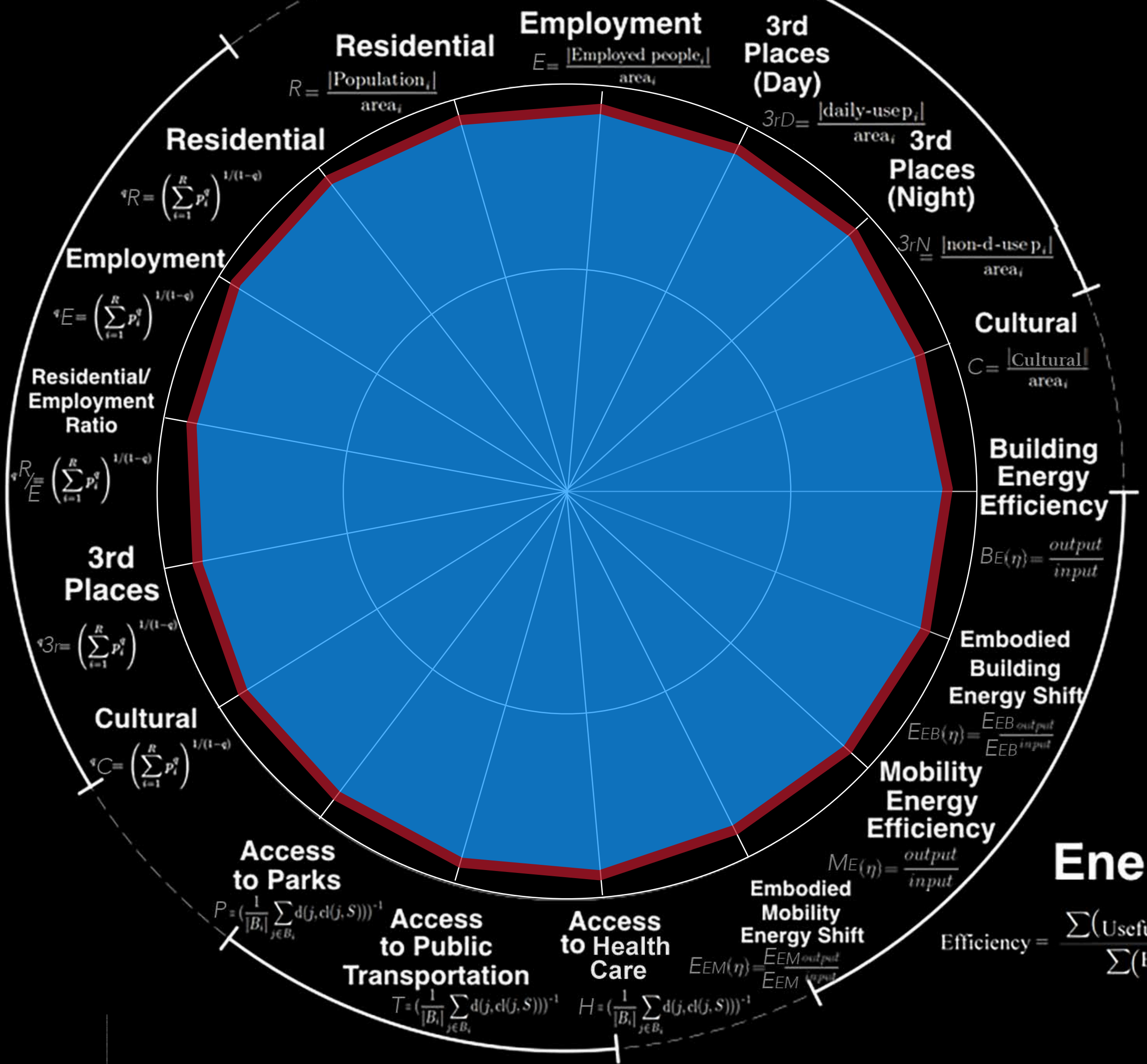
$$\text{closeness to} = \left(\frac{1}{|B_i|} \sum_{j \in B_i} \text{dist}(j, \text{closest}(j, SM)) \right)^{-1}$$



DENSITY WITHOUT CONGESTION

Density

$$\text{Urban Density} = \frac{|\text{Urban activity}_i|}{\text{area}_i}$$



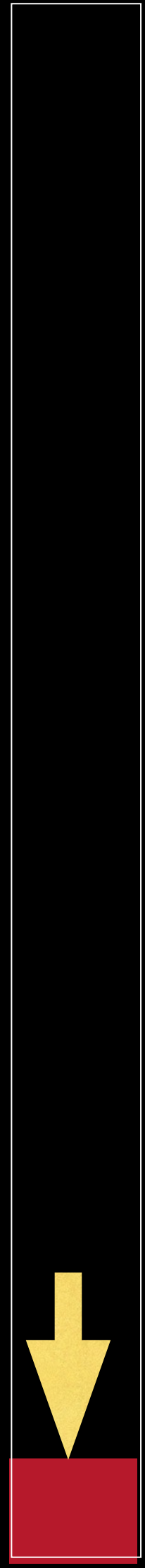
Diversity

$$H' = - \sum_{i=1}^R p_i \ln p_i$$

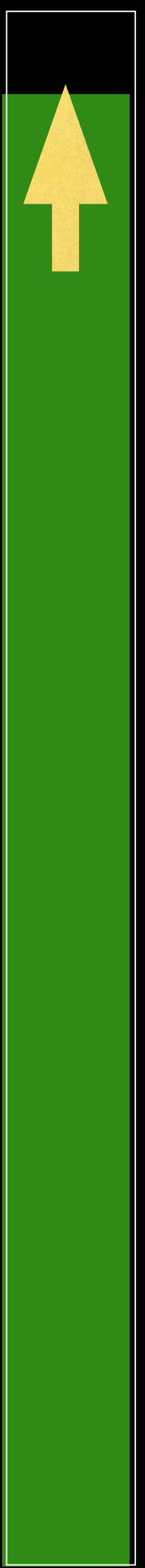
Shannon index (Ecosystems)

Energy

$$\text{Efficiency} = \frac{\sum(\text{Useful Energy Outp})}{\sum(\text{Energy Input})}$$



CO2 Generation



Social Performance

Proximity

$$\text{looseness to} = \left(\frac{1}{|B_i|} \sum_{j \in B_i} \text{dist}(j, \text{closest}(j, SM)) \right)^{-1}$$







Kent Larson