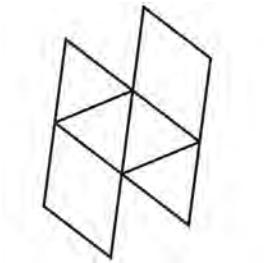
Digitalization in Urban Design Forum
数字化城市设计论坛

Urban Intensity and Obsolescence in Urban Design
城市设计中的城市强度与更新

Part I Urban Intensity

Part II Obsolescence in Urban Design

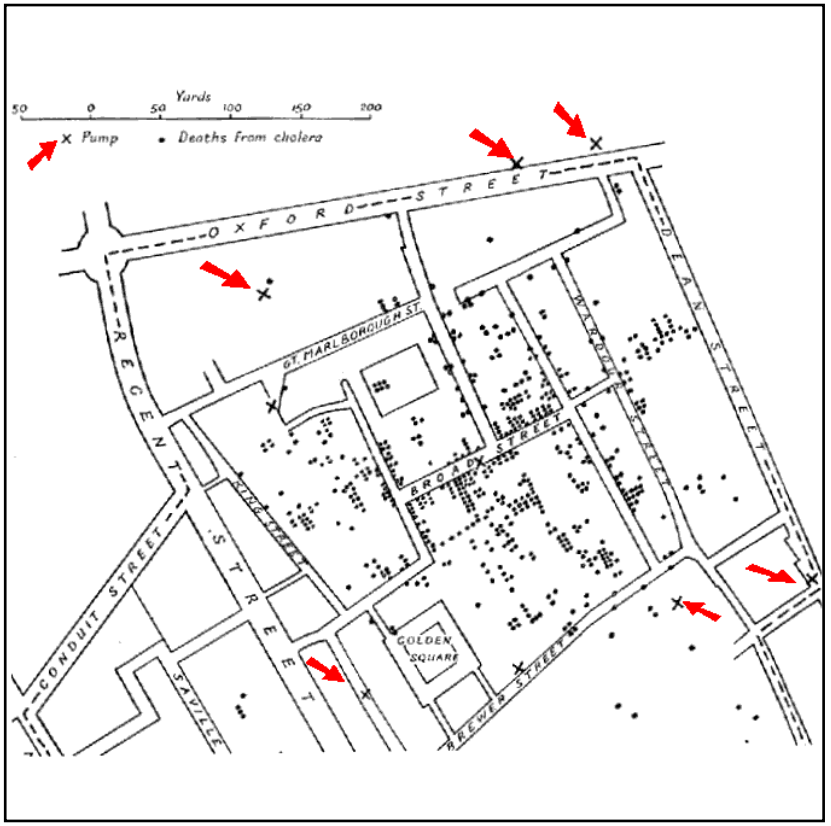


ChengHe Guan | Harvard University
关成贺 哈佛大学

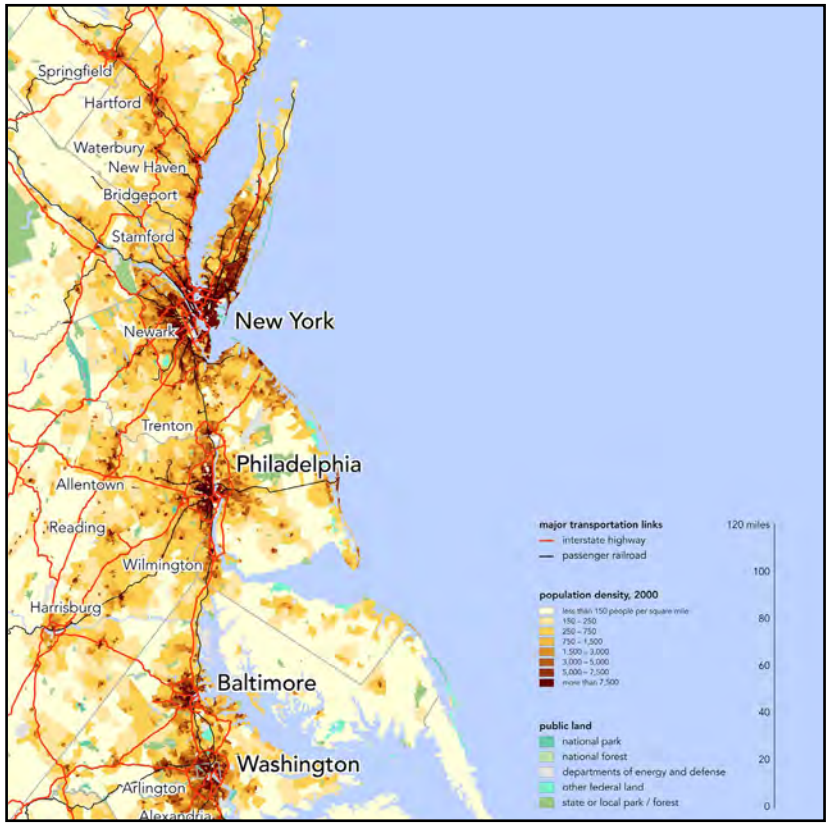
May 26, 2017

数字化城市设计中的决策：可持续与健康

How can we make decisions to achieve a sustainable and healthy urban future?

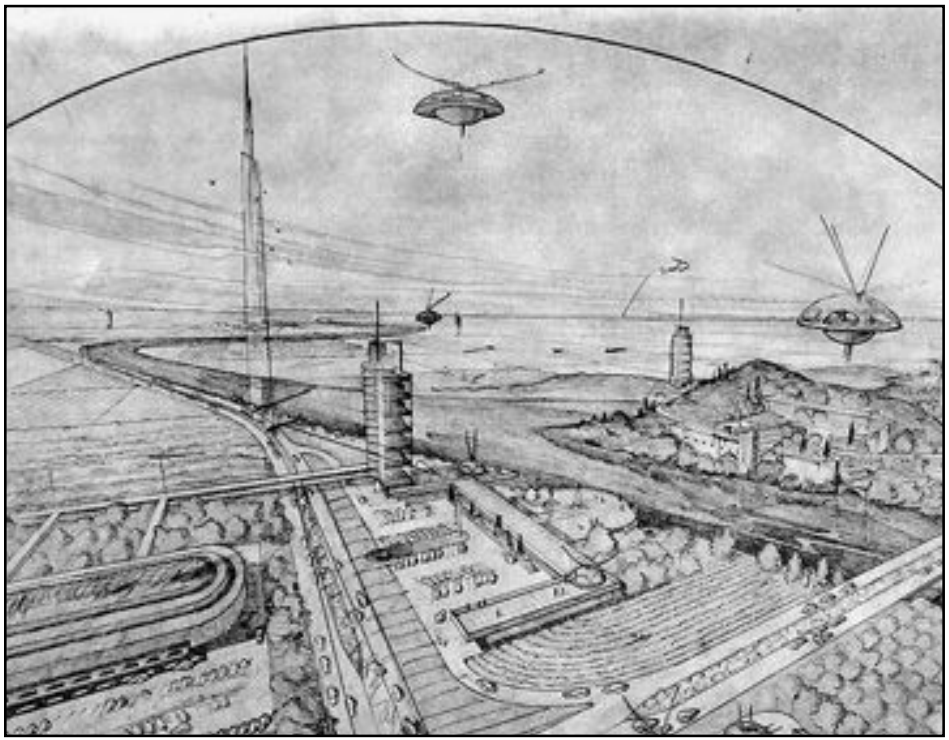


John Snow (1855). *On the mode of communication of cholera.* London: John Churchill.



Jean Gottmann (1961). Megolopolis, The Urbanized Northeastern Seaboard of the United States

机遇与挑战
Challenges and opportunities



Frank Lloyd Wright's Broadacre City, 1932

Metabolist's Tokyo Bay Plan, 1960

城市形态

A spatio-temporal approach - Form

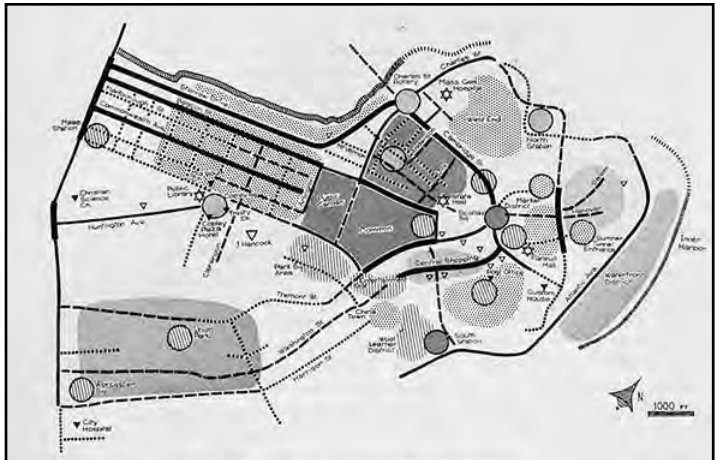


FIG. 35. *The Boston image as derived from verbal interviews*

FIG. 36. *The Boston image as derived from sketch maps*

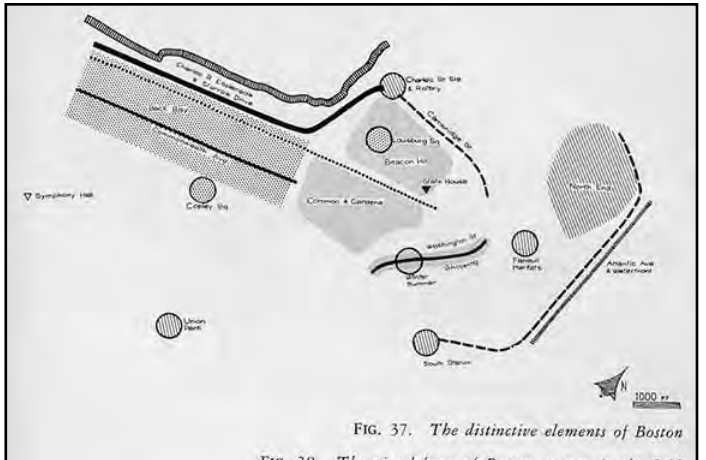


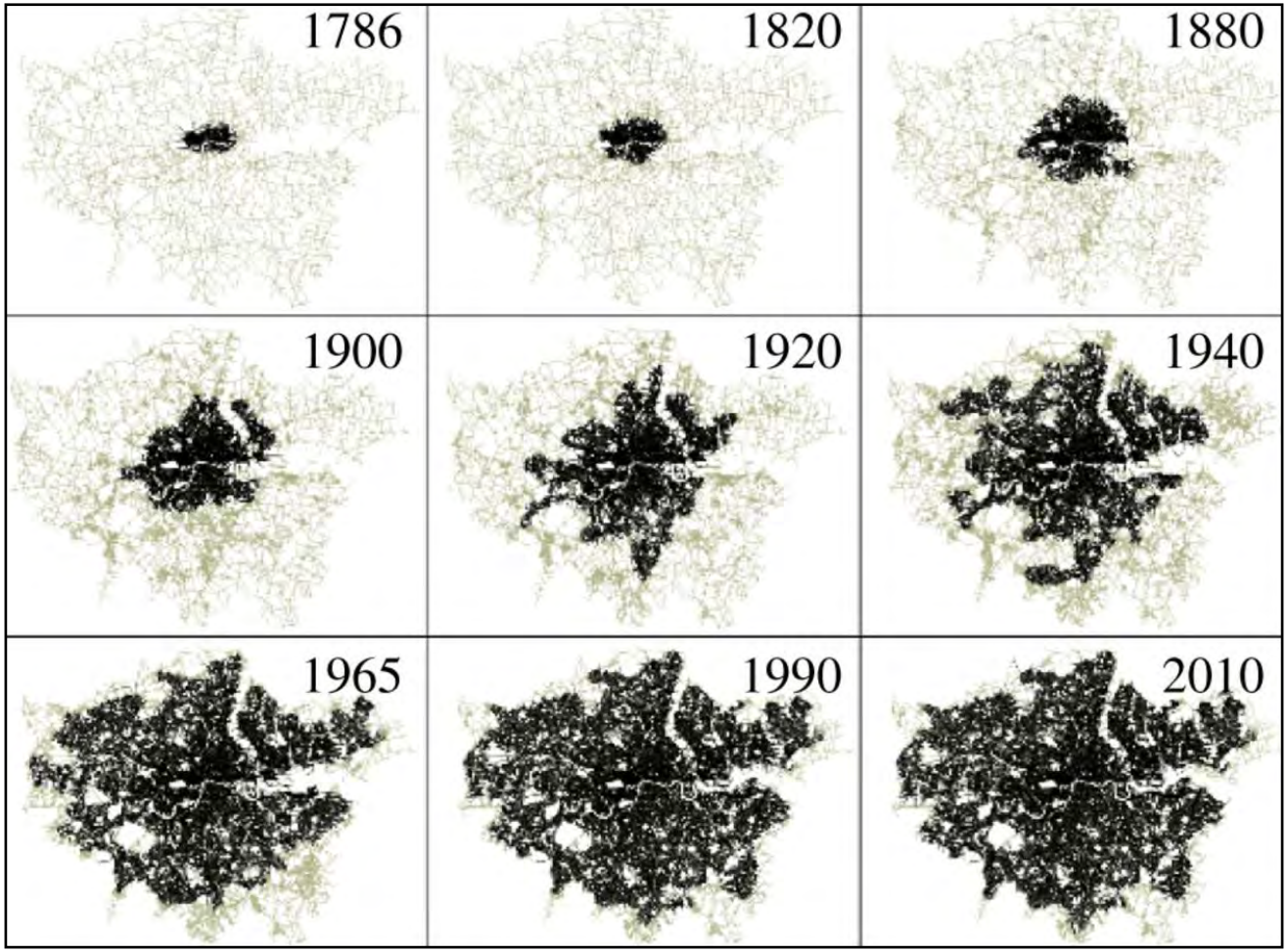
FIG. 37. *The distinctive elements of Boston*

FIG. 38. *The visual form of Boston as seen in the field*

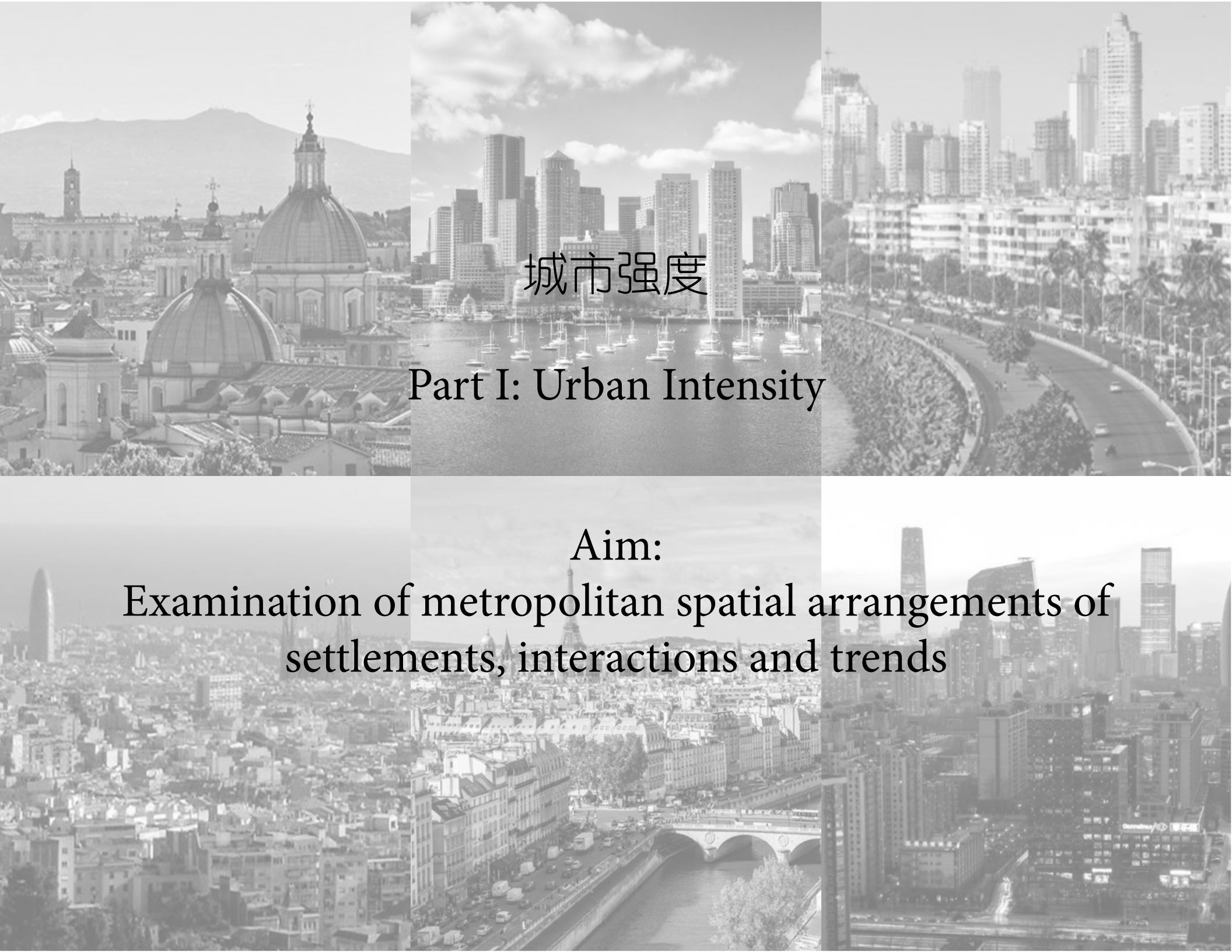
Lynch, K.A. (1960). *The Image of the City*. Cambridge MA: MIT Press.

城市演变

A spatio-temporal approach - Transformation



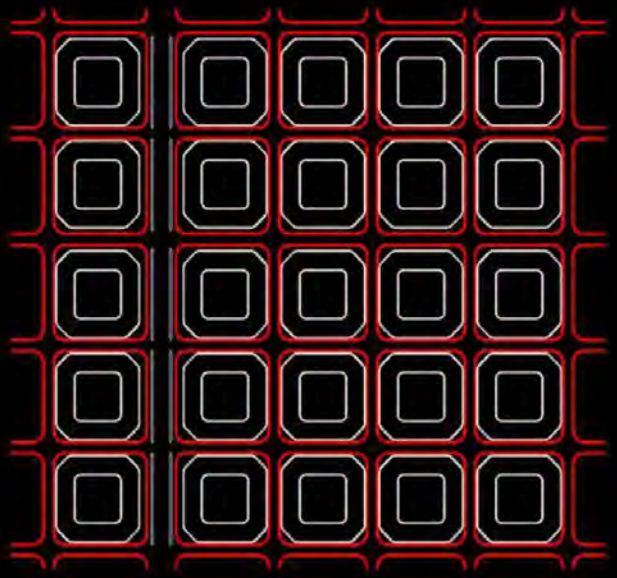
Batty, M. (2011). Building a science of cities. *Cities*, 29, S9-S16.

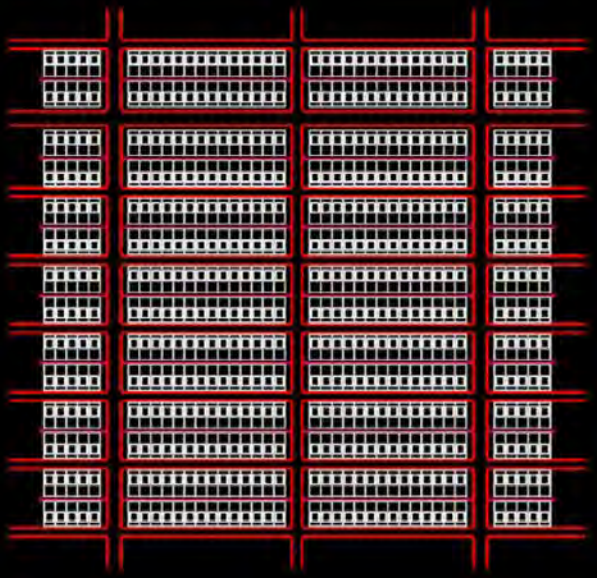


城市强度

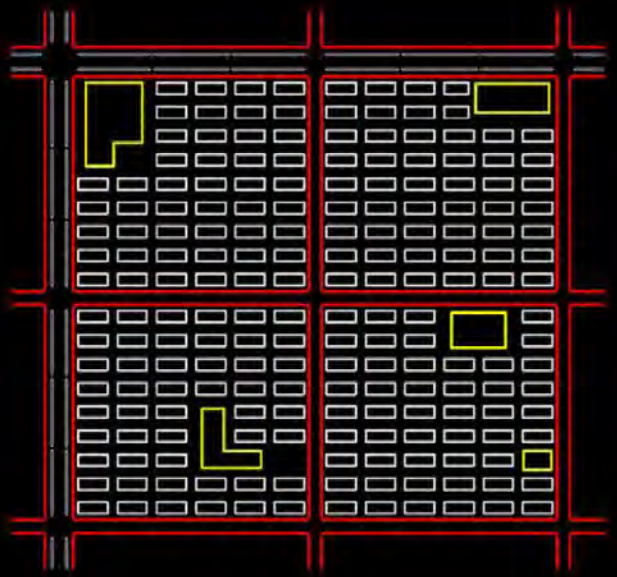
Part I: Urban Intensity

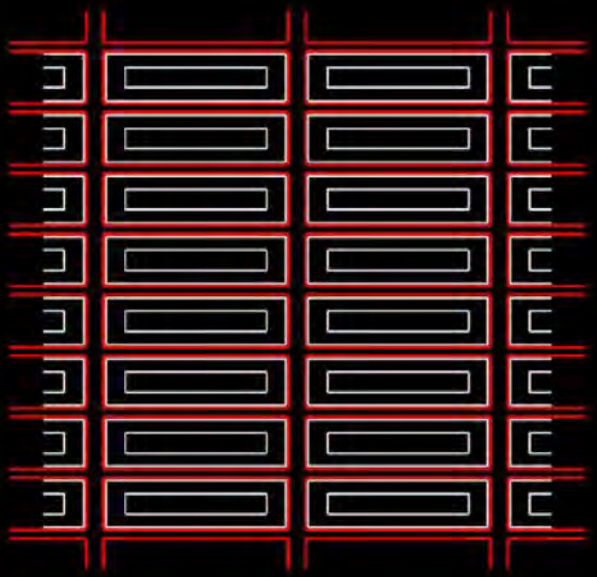
Aim:
Examination of metropolitan spatial arrangements of settlements, interactions and trends





城市本体特性





研究问题
Research Questions

a. What urban forms perform better for small towns and how to measure them?

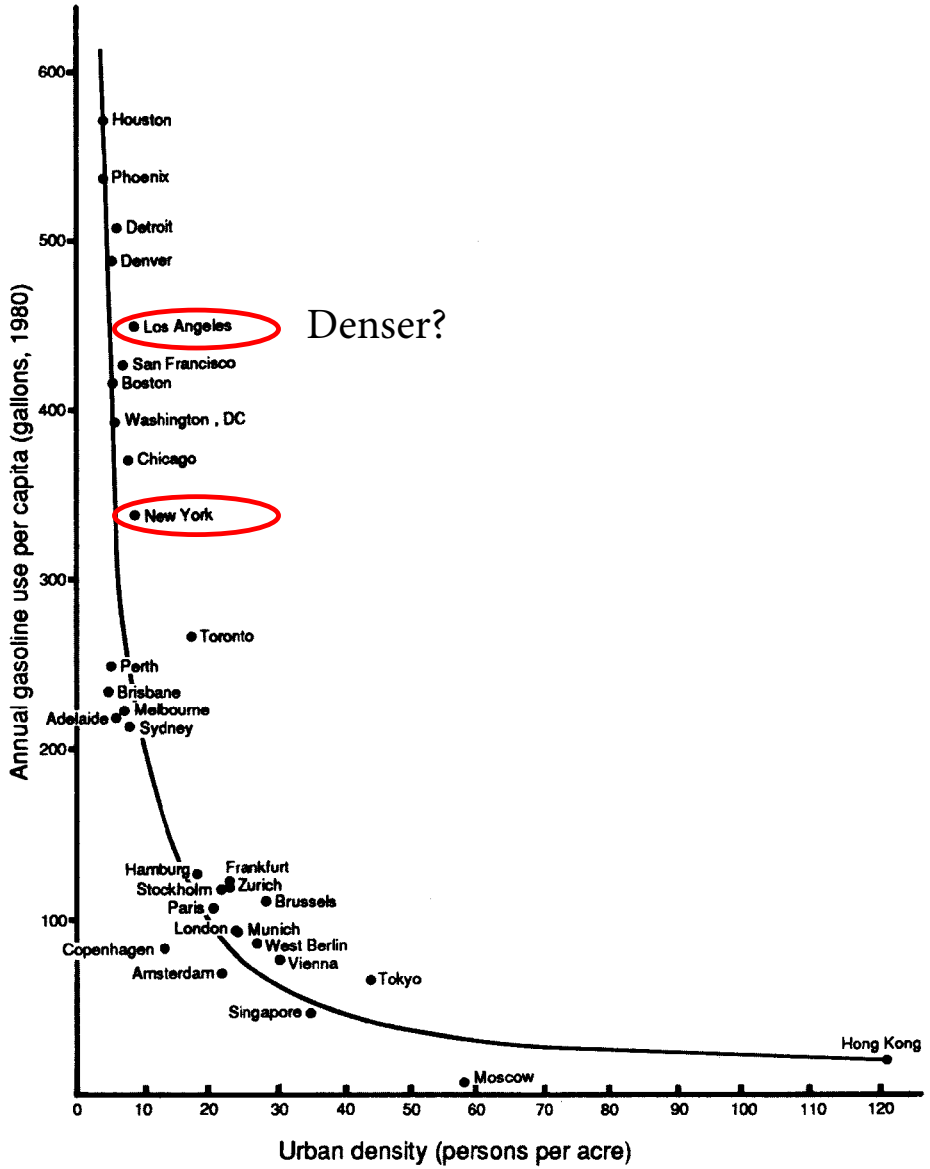
b. Should cities and towns of different sizes follow similar spatial arrangments?

1. 什么是城市强度的概念？
1. What is urban intensity ?

Describing an urban form that is compact, dense, diverse in its parts and well interconnected (Rowe, 2014).

Shaped by resource consumption, economic opportunity, social integration, and environmnetal performace (Guan&Rowe, 2016).

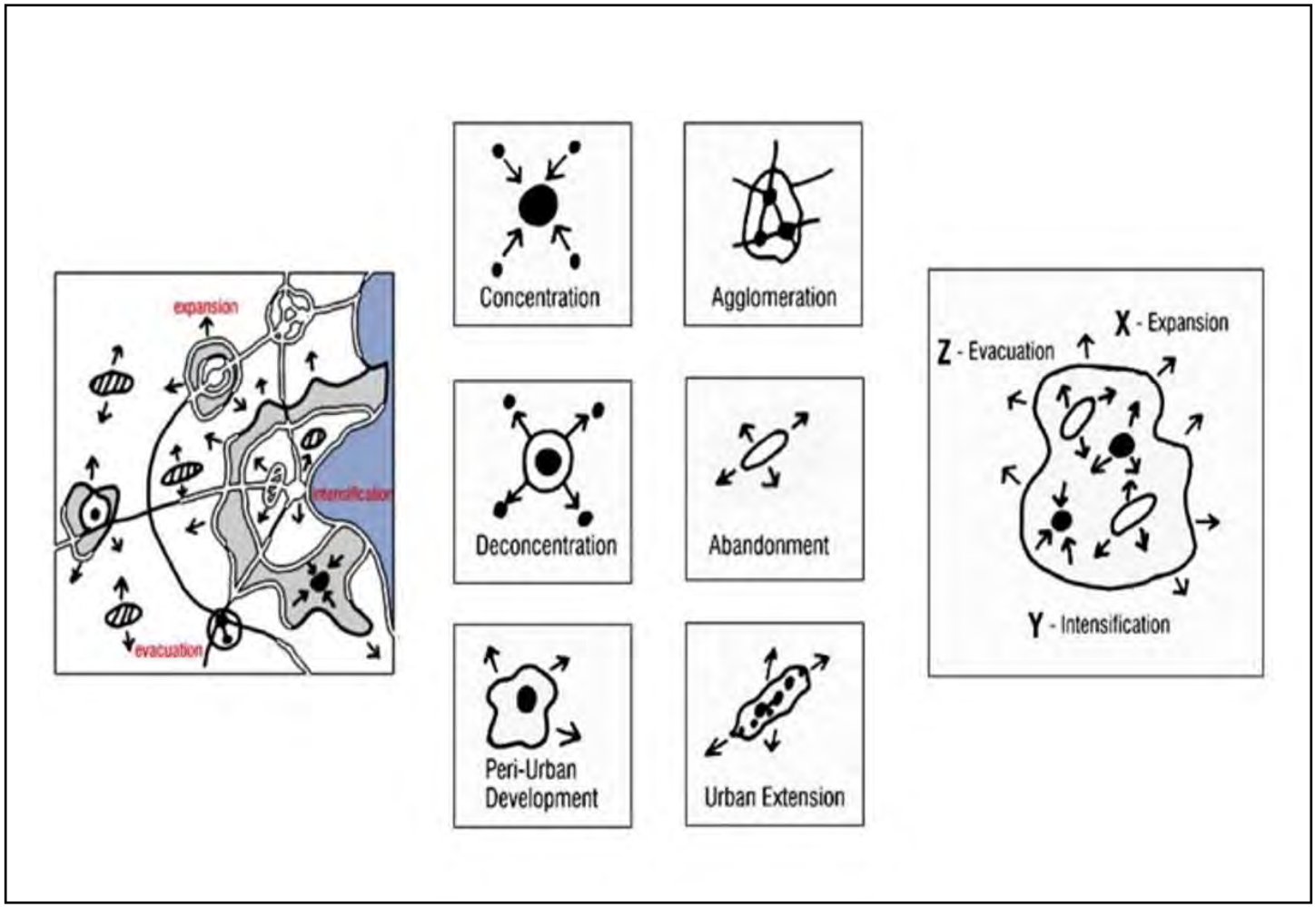
密度
Density



Denser?

Newman, P. and Kenworthy, J. (1989) Gasoline consumption and cities. *Journal of American Planning Association* 55, 1: 24-37.

紧实度
Compactness



Various ways of urban transformation based on three basic operations:
Expansion, Evacuation, and Intensification


多样性
Diversity

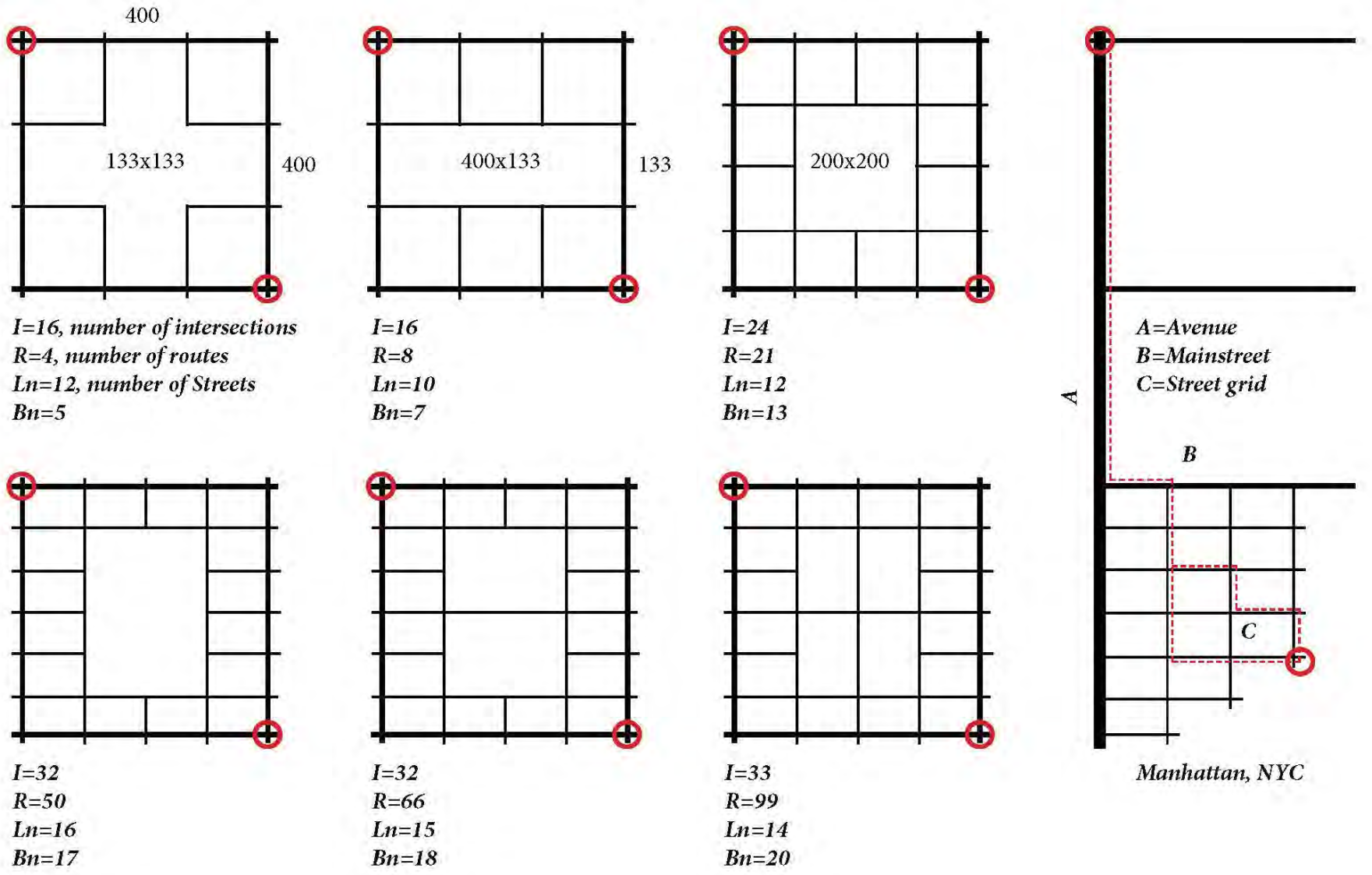
连接性
Connectivity

The CAGE distance framework

	Cultural distance	Administrative distance	Geographic distance	Economic distance
External distance (bilateral/ plurilateral/ multilateral attributes)	Different languages Different ethnicities/lack of connective ethnic or social networks Different religions Differences in national work systems Different values, norms and dispositions	Lack of colonial ties Lack of shared regional trading bloc Lack of common currency Different legal system Political hostility	Physical distance Lack of land border Differences in climates (and disease environments) Differences in timezones	Differences in consumer incomes Differences in availability of: Human resources Financial resources Natural resources Intermediate inputs Infrastructure Supplier/distribution structure Complements Organizational capabilities
Internal distance (unilateral attributes)	Traditionalism Insularity Spiritualism Inscrutability	Nonmarket/closed economy (home bias versus foreign bias) Lack of membership in International organizations Weak legal institutions/ corruption Lack of government checks and balances Societal conflict Political/expropriation risk	Landlockedness Geographic size Geographic remoteness	(Economic size) Low per capita income Low level of monetization Limited resources, inputs, infrastructure, complements, capabilities

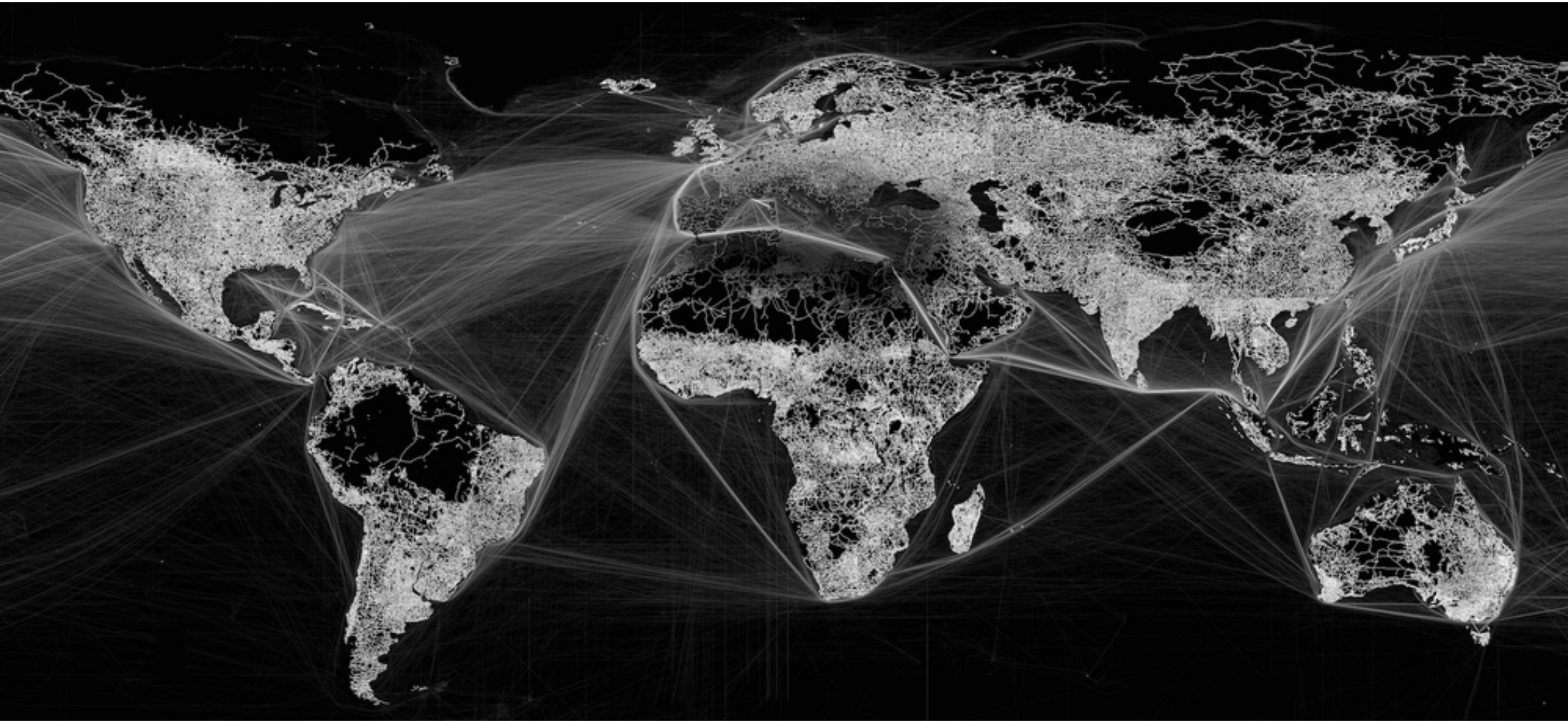
Pankaj Ghemawat and Jordan Siegel (2011).
Cases about Redefining Global Strategy, Harvard Business Review Press.

多孔性的城市街区网络
Networks of varying porosity and citywide connection



Peter Rowe and ChengHe Guan (2016). Striking balances between China's urban communities, blocks, and their layouts.

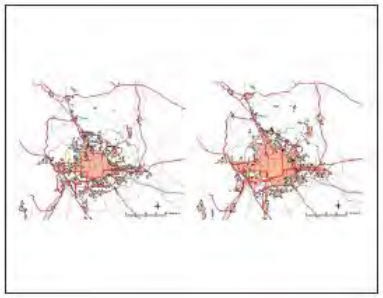
行星城市主义
Planet urbanism



Neil Brenner - Urban theory lab.

空间环境的相关概念

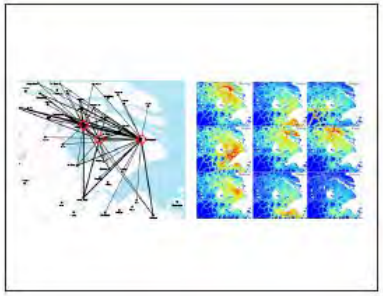
Four related concepts of spatial conditions



Compactness
(Com)

Diversity
(Div)

Density
(Den)



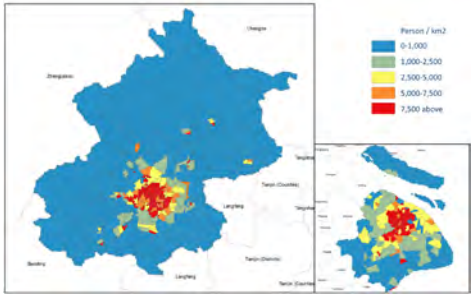
Connectivity
(Con)

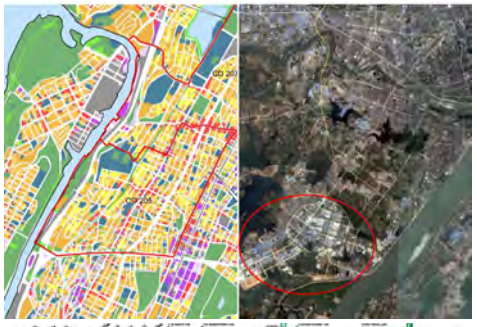
Urban Intensity = f (Com, Div, Den, Con)

以公交为导向的城市发展
Transit Oriented Development

Practice with Maki and Associates - Taipei main station area redevelopment

内在矛盾
Inherent Paradoxes





1. Compactness

Spread ⟷ Compact

2. Density

Sprawl ⟷ Overcrowding

3. Diversity

Fine Grain ⟷ Scale Economy

4. Connection

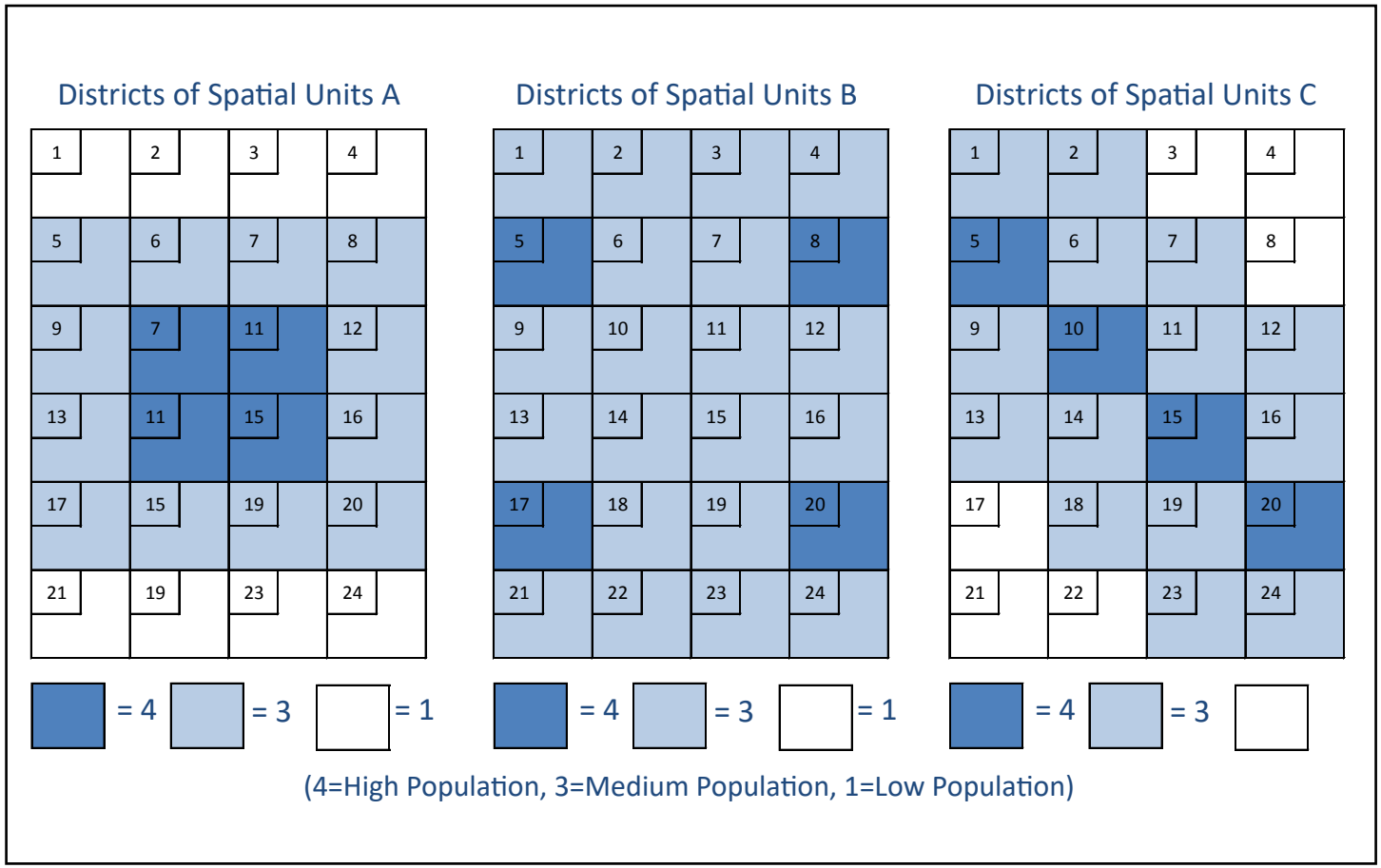
Dispersed ⟷ Concentrated

普鲁伊特：从城市更新到新城市主义

Pruitt-Igoe Complex, St. Louis
From urban renewal to new urbanism

2. 城市强度假设案例

2. Three hypothetical cases of urban intensity



结果

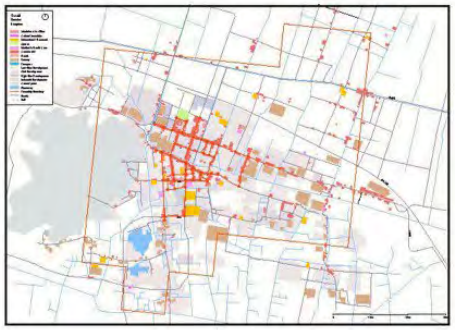
Results

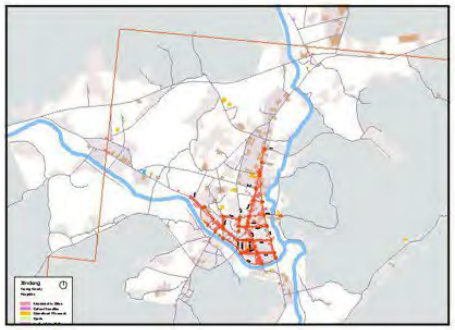
	Mono	Poly	Linear
Density	2.50	3.17	2.67
Compactness	I = 0.12	I = 0.01	I = 0.09
Diversity	Div = 0.23	Div = 0.04	Div = 0.19
Connectedness	Con = 0.84	Con = 0.98	Con = 0.92
Composite Score	-0.53	0.16	-0.31

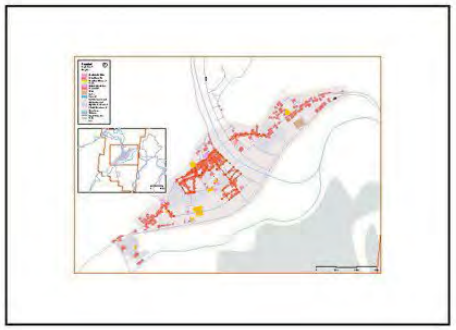
The Composite Score is a function of f(a*Den+b*Com+c*Div+d*Con) where Density and Connectedness are normalized by the means. A larger positive number represents better performace in terms of urban intensity.

3. 实验性小镇案例

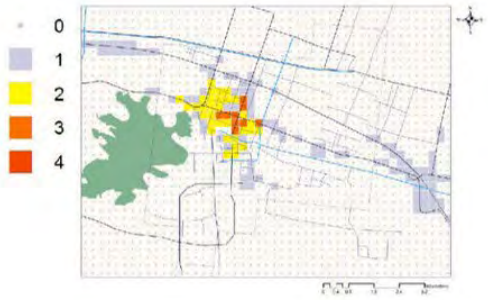
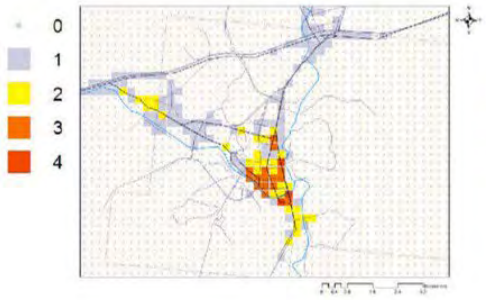
3. Three experimental towns







	Guali	Xindeng	Fenshui
Population	146,410	70,580	55,049
Built Area	24.50 km2	11.96 km2	4.59 km2

	Guali	Xindeng	Fenshui
			
Density	1.40	0.67	0.92
Compactness	1.14	0.66	1.19
Diversity	1.03	1.03	0.92
Connectedness	0.97	1.14	0.87
Composite Score	4.55	3.53	3.91

策略分析
Strategies to enhance the performance of towns and small cities

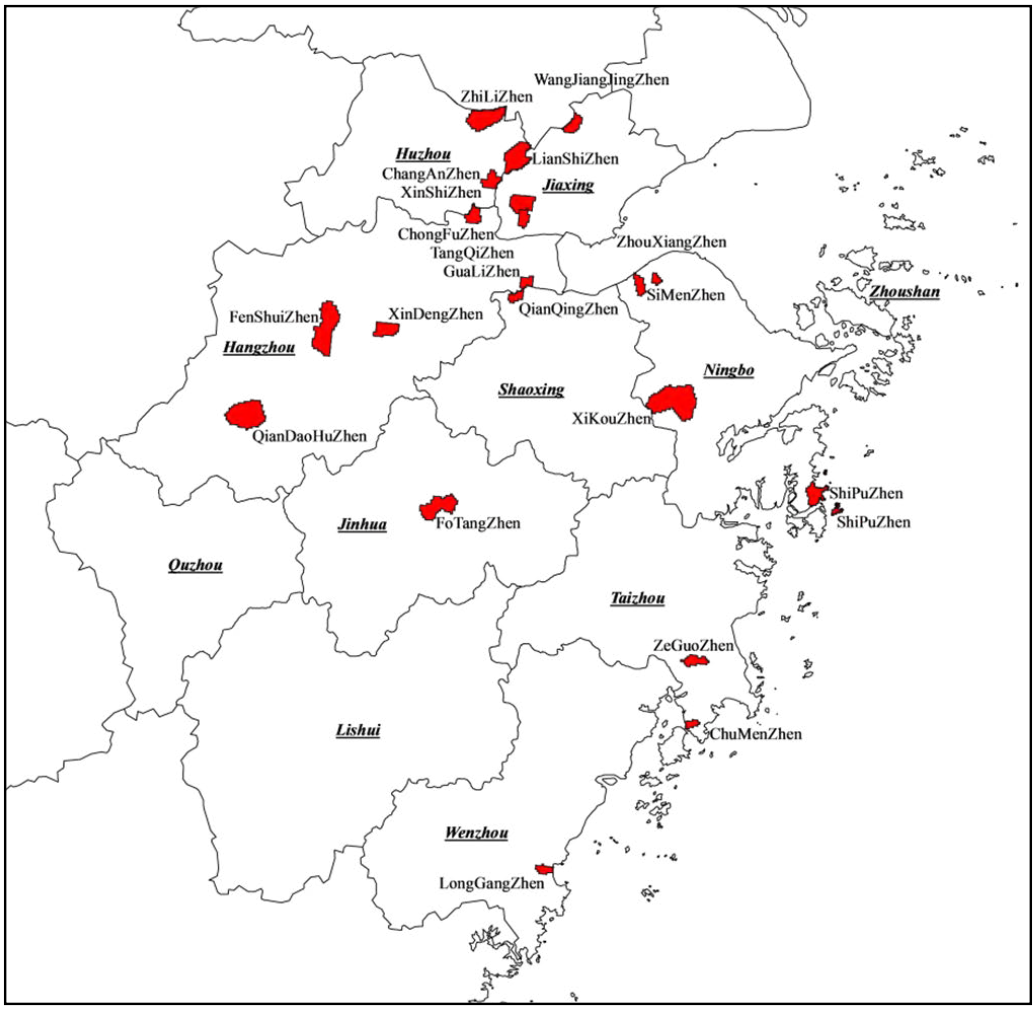
a. Provision of strong linkage to outside environments and networks.

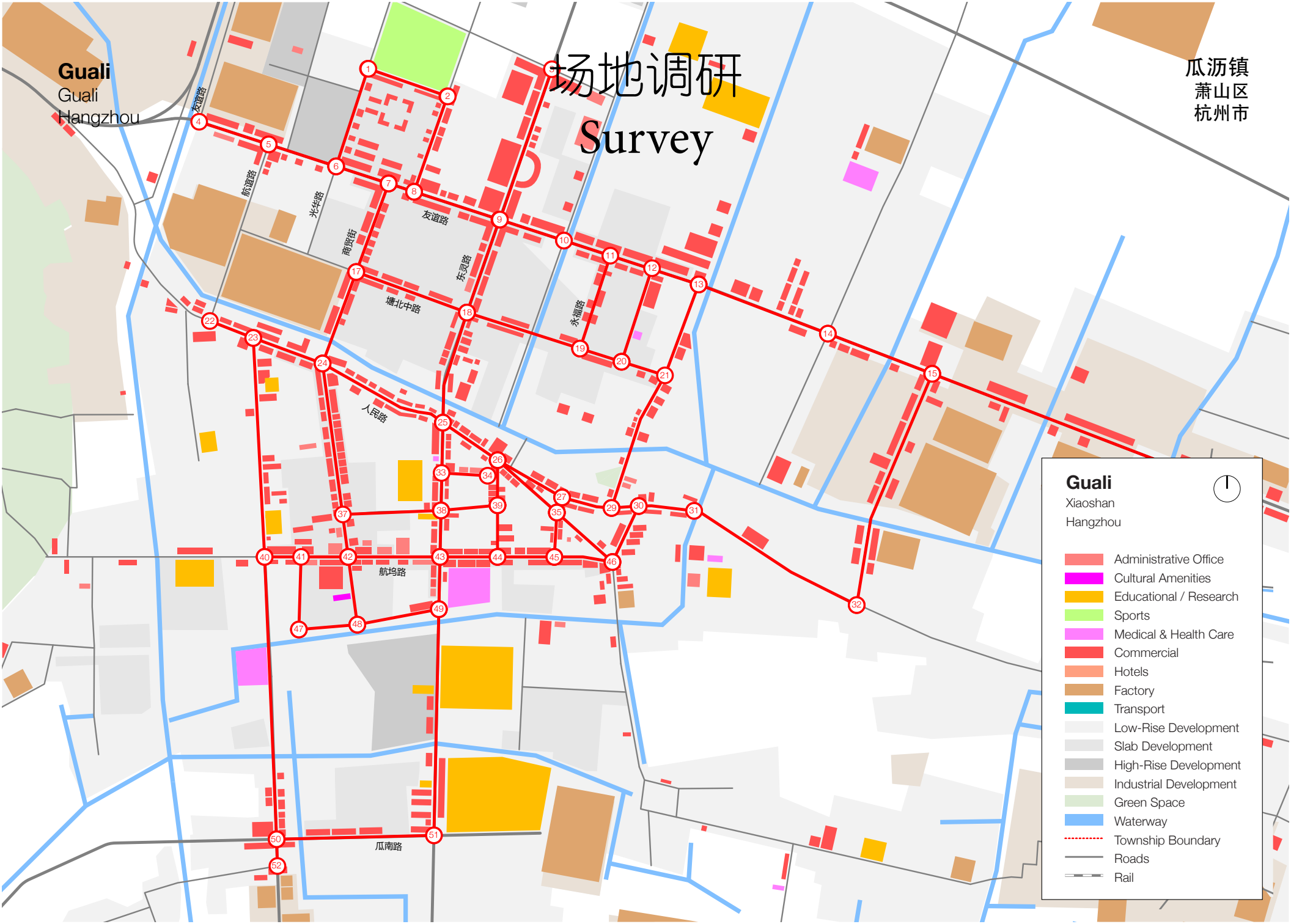
b. Agglomeration to scale for service provision.

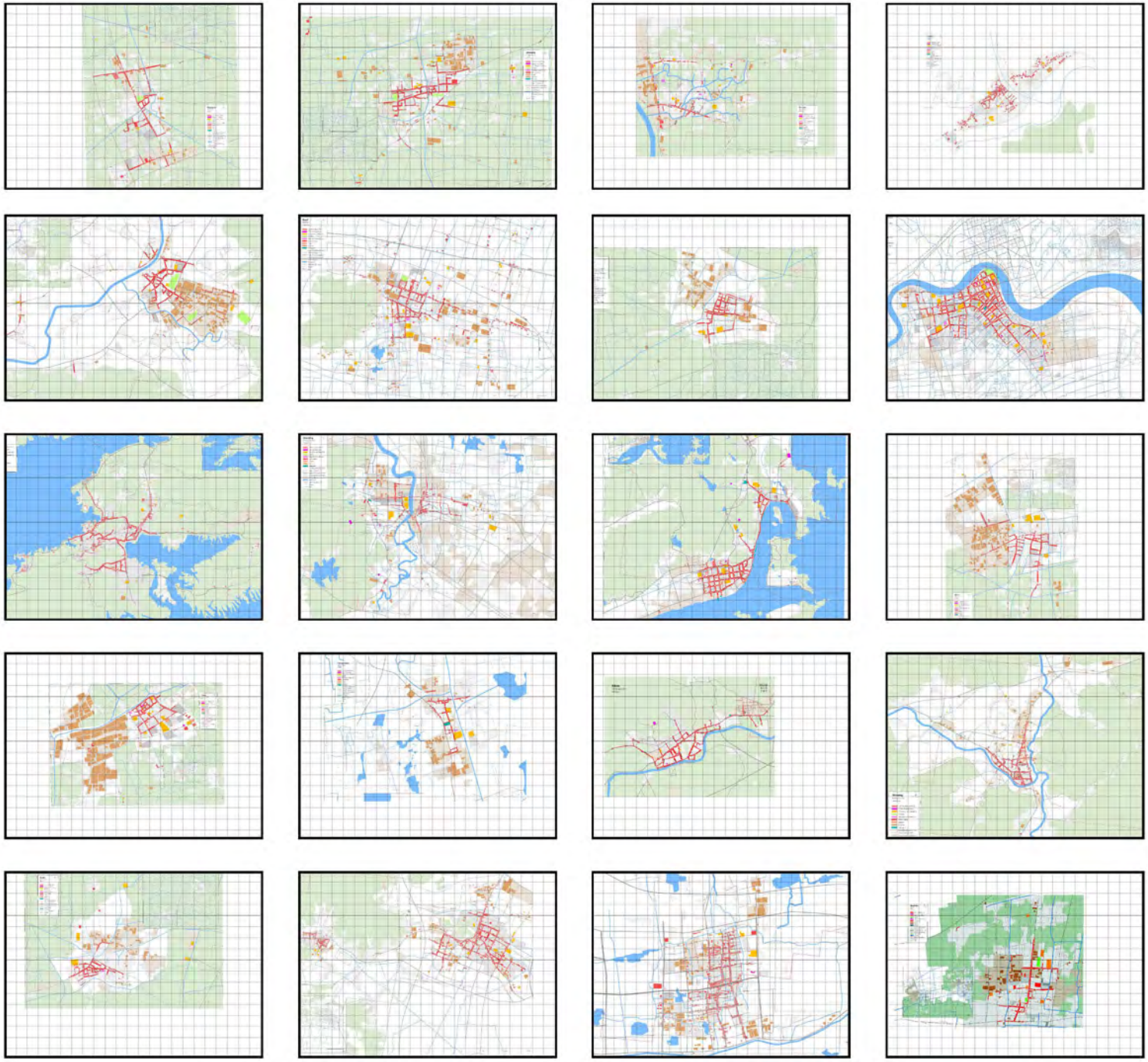
c. Development of place identity, tangible and intangible culture.

d. Balancing of new development, redevelopment, and environmental amenity.

4. 浙江省小城镇案例分析
4. Twenty small towns from Zhejiang Province

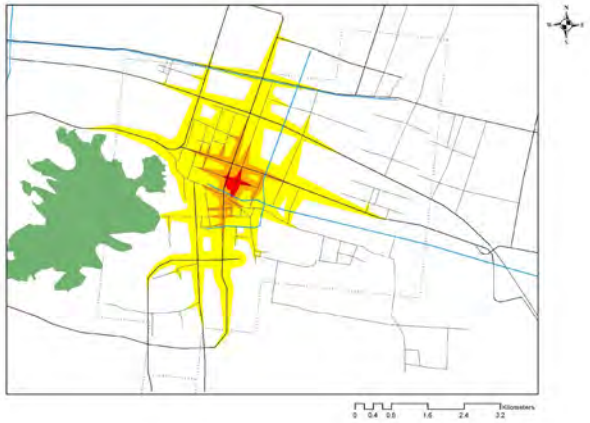



Guali
Guali
Hangzhou
场地调研
Survey
瓜沥镇
萧山区
杭州市
友谊路
航道路
兴华路
商贸街
友谊路
东灵路
塘北中路
永福路
人民路
航坞路
瓜南路
Guali
Xiaoshan
Hangzhou
Administrative Office
Cultural Amenities
Educational / Research
Sports
Medical & Health Care
Commercial
Hotels
Factory
Transport
Low-Rise Development
Slab Development
High-Rise Development
Industrial Development
Green Space
Waterway
Township Boundary
Roads
Rail

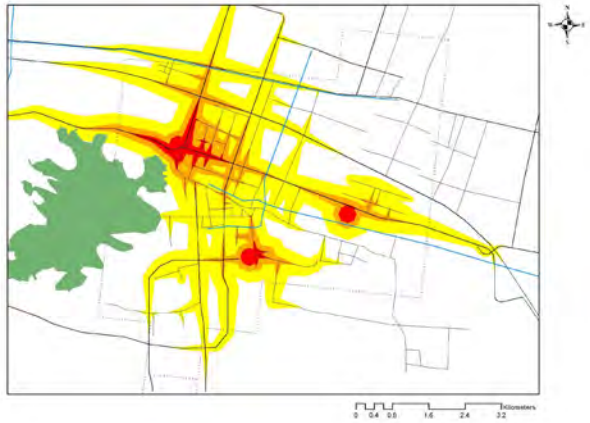


区位分析
Locational analysis

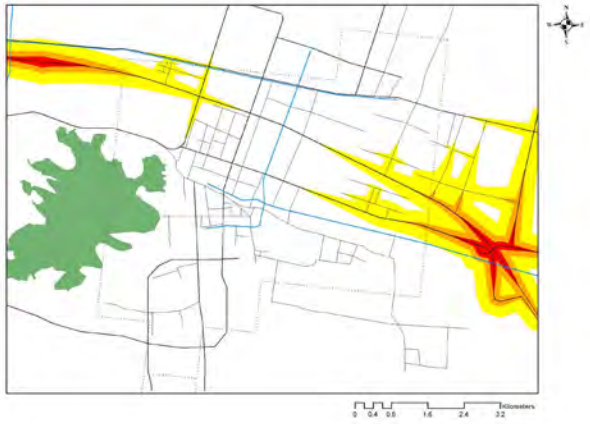
Commercial



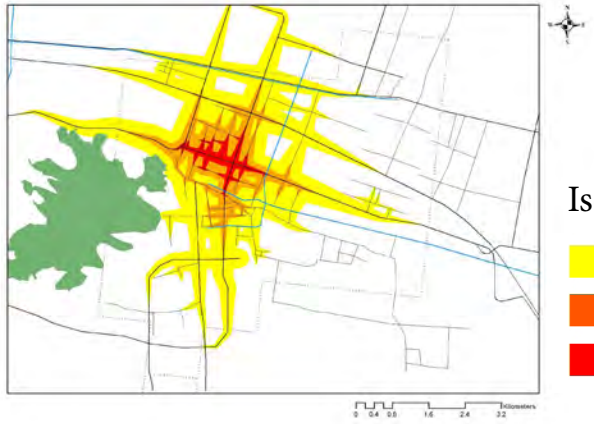
Employment



Transport



City hall

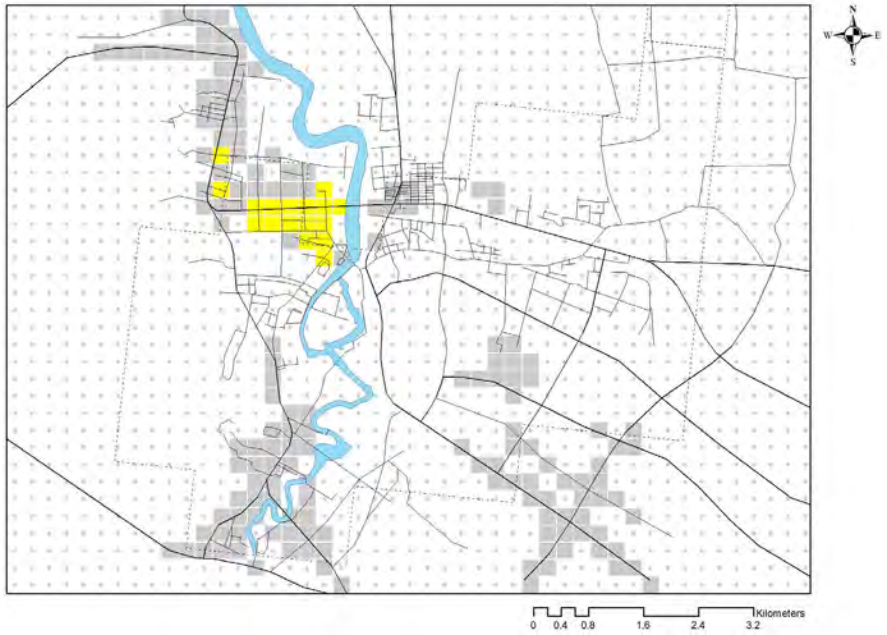


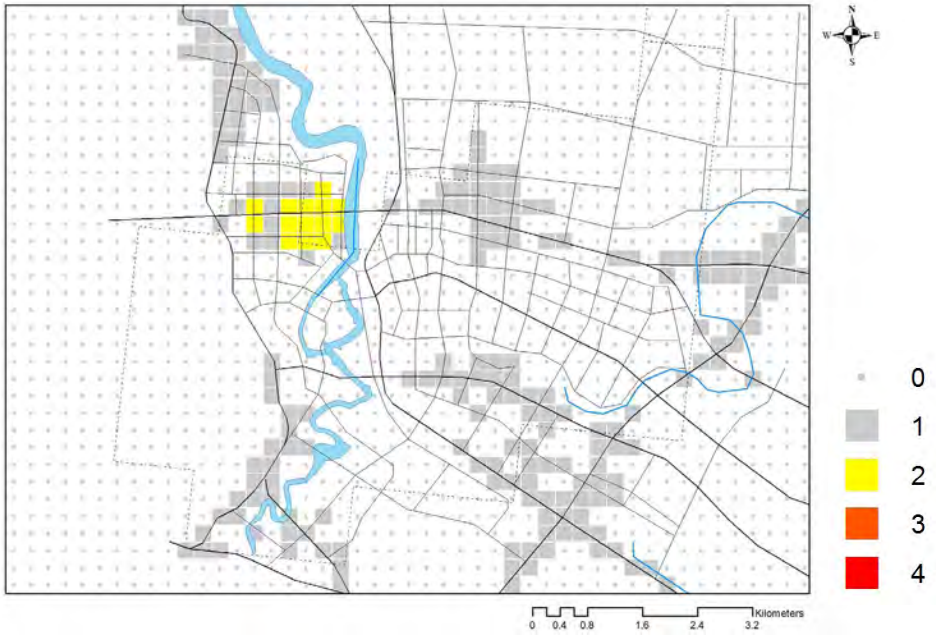
Isotimelines

- 10 min
- 5 min
- 2.5min

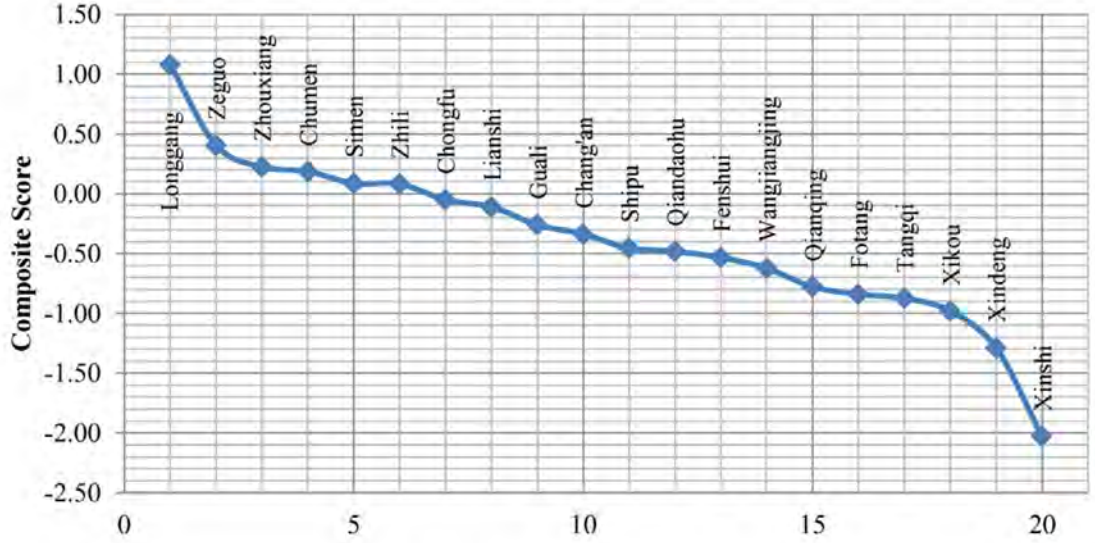
Locational analysis

现状与未来规划
Existing conditions vs. proposed plans

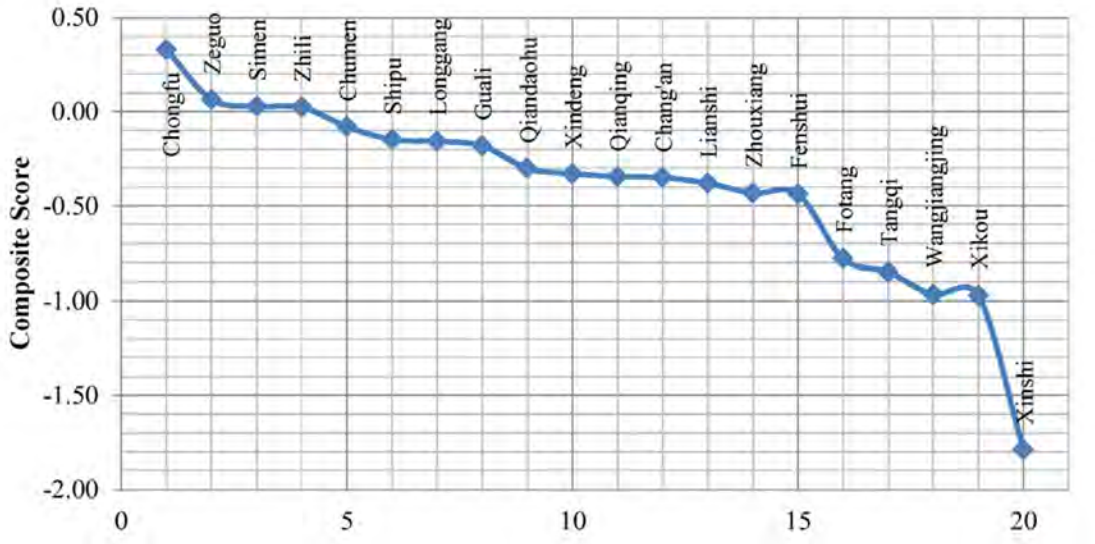




排序
Rankings



	Compactness	Diversity	Density	Connectivity
Compactness	1.0000	-	-	-
Diversity	-0.0750	1.0000	-	-
Density	2.6650	-0.2430	1.0000	-
Connectivity	0.1444	0.4008	-0.0298	1.0000



结论
Conclusions

a. Uniform grids
Relatively uniform grids of streets alongside of integrated zones of use appear to perform better

b. Sharp separations
Sharp separations of uses and zones of development performed less well.

c. Monocentricity
Monocentric morphologies are more or less optimal spatial formations for medium to small-sized towns, certainly in the range of 50,000 to 200,000 inhabitants. Linear arrangements seem to be less favorable.

城市强度与开放空间：利雅得城市发展计划
Arriyadh Development Authority
UNESCO Site Planning Proposal

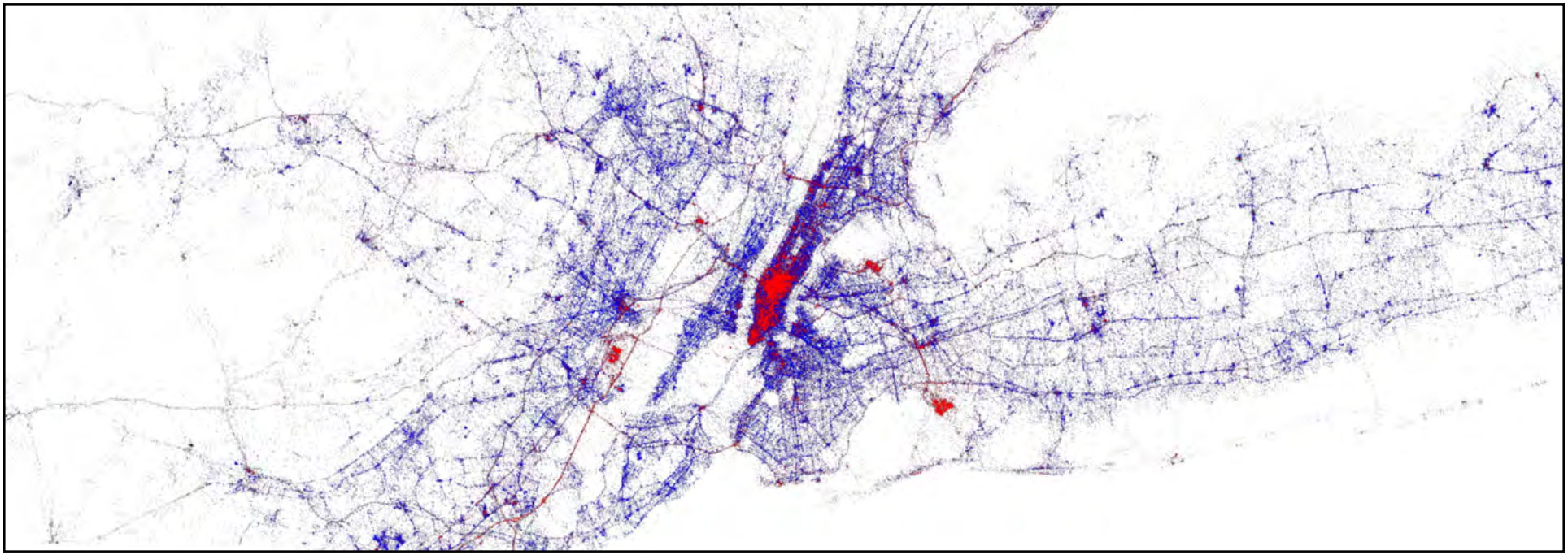
ChengHe Guan and Tiffany Lau (2012). At'turaif Urban Development 2012 to 2032.

城市强度与社会公平

Urban intensity and social equity

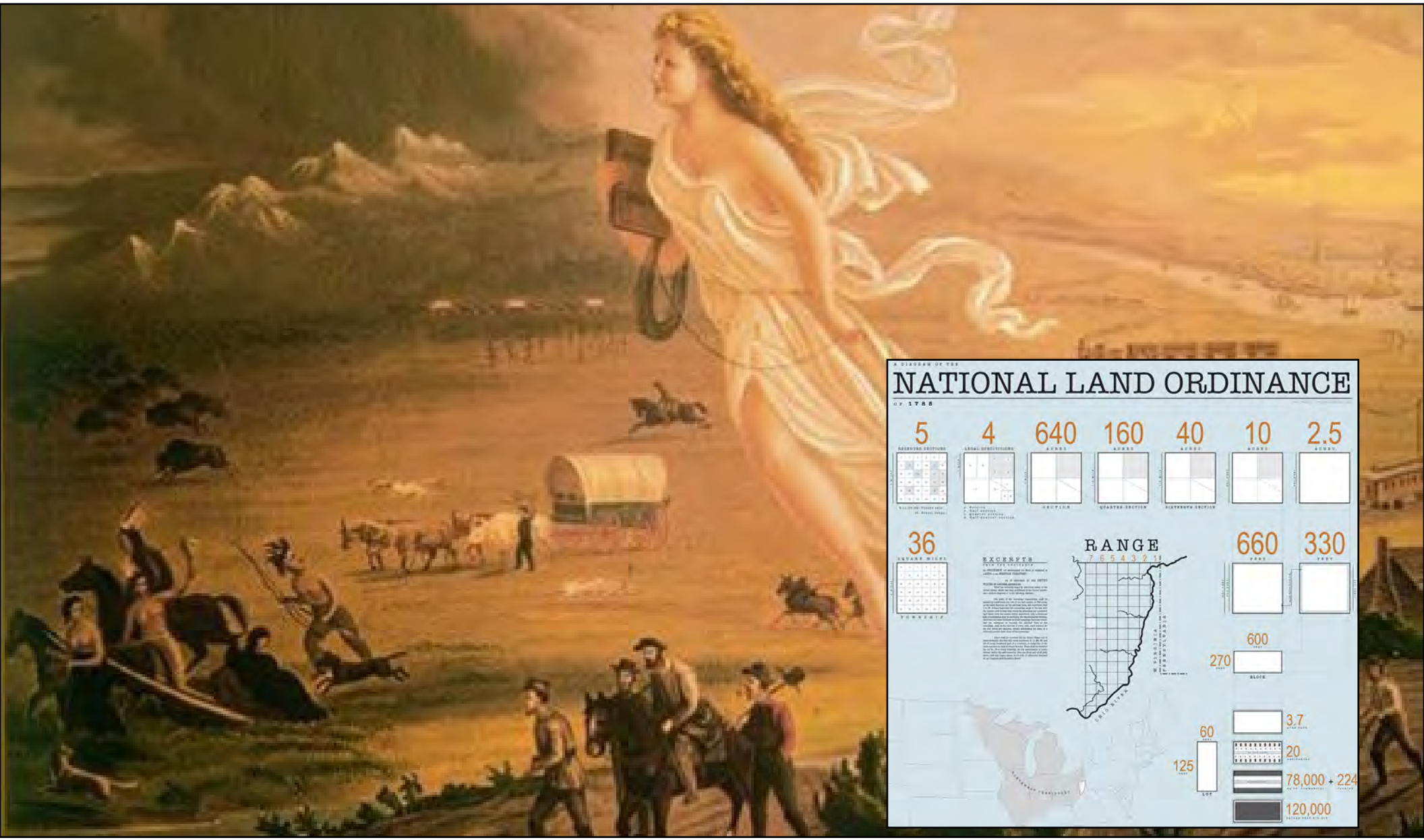
Completing the Emerald Necklace: For whose benefit?

城市强度与城市形态
Urban intensity and urban form



Tourists vs. Residents based on data collected from twitter

城市强度与国家安全
Urban intensity and national security



Designing the American city: Civic aspirations and urban form
Teaching team: Alex Krieger, Justin Stern (TF), ChengHe Guan (TF)

形态，演变，与健康公平

Form, transformation, and global health equity

Population and household projections