

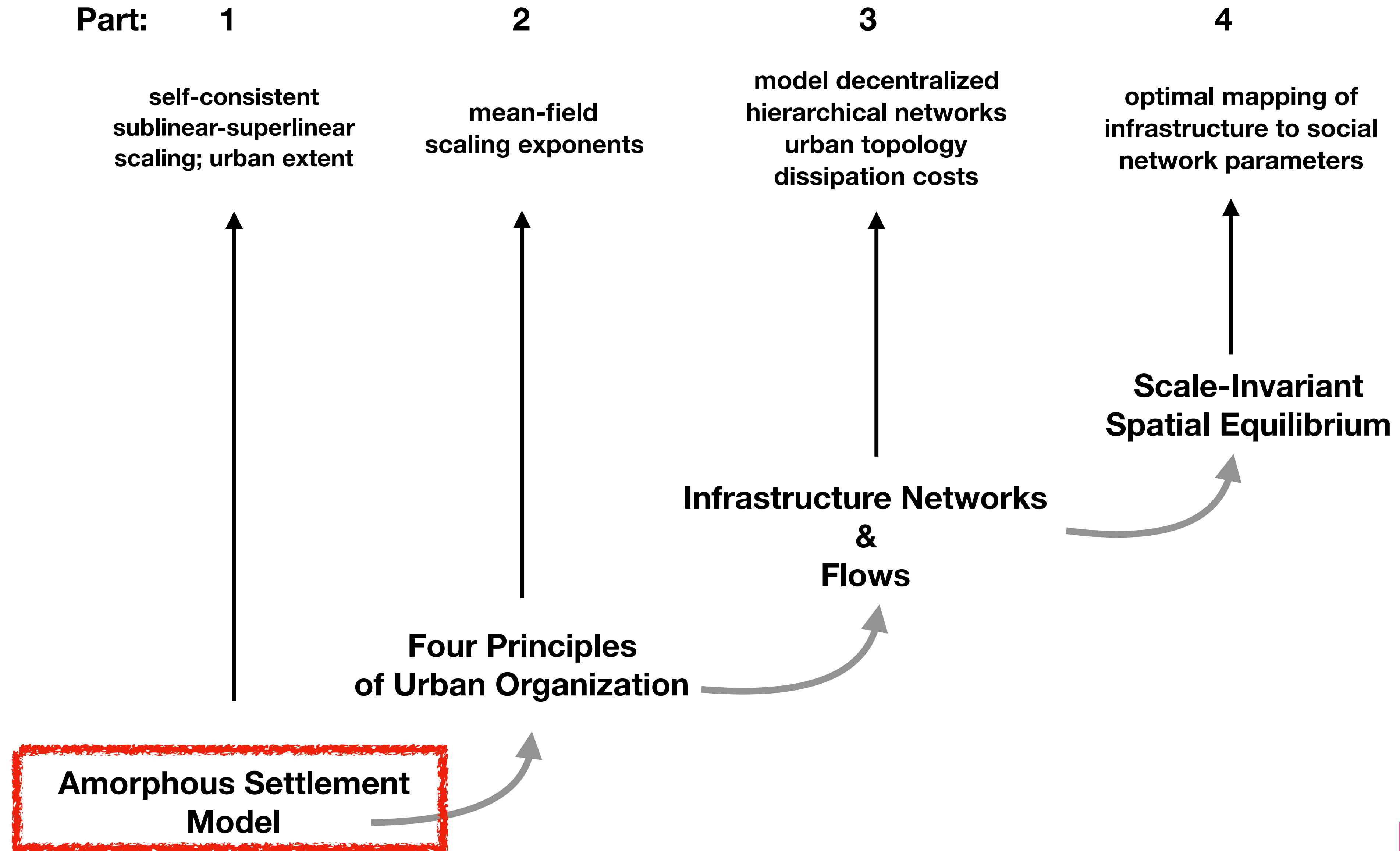
Lecture 6

Network Models of Cities

6.2 A First Model: The Amorphous Settlement Model and Urban Scaling

IUS 3.2.2

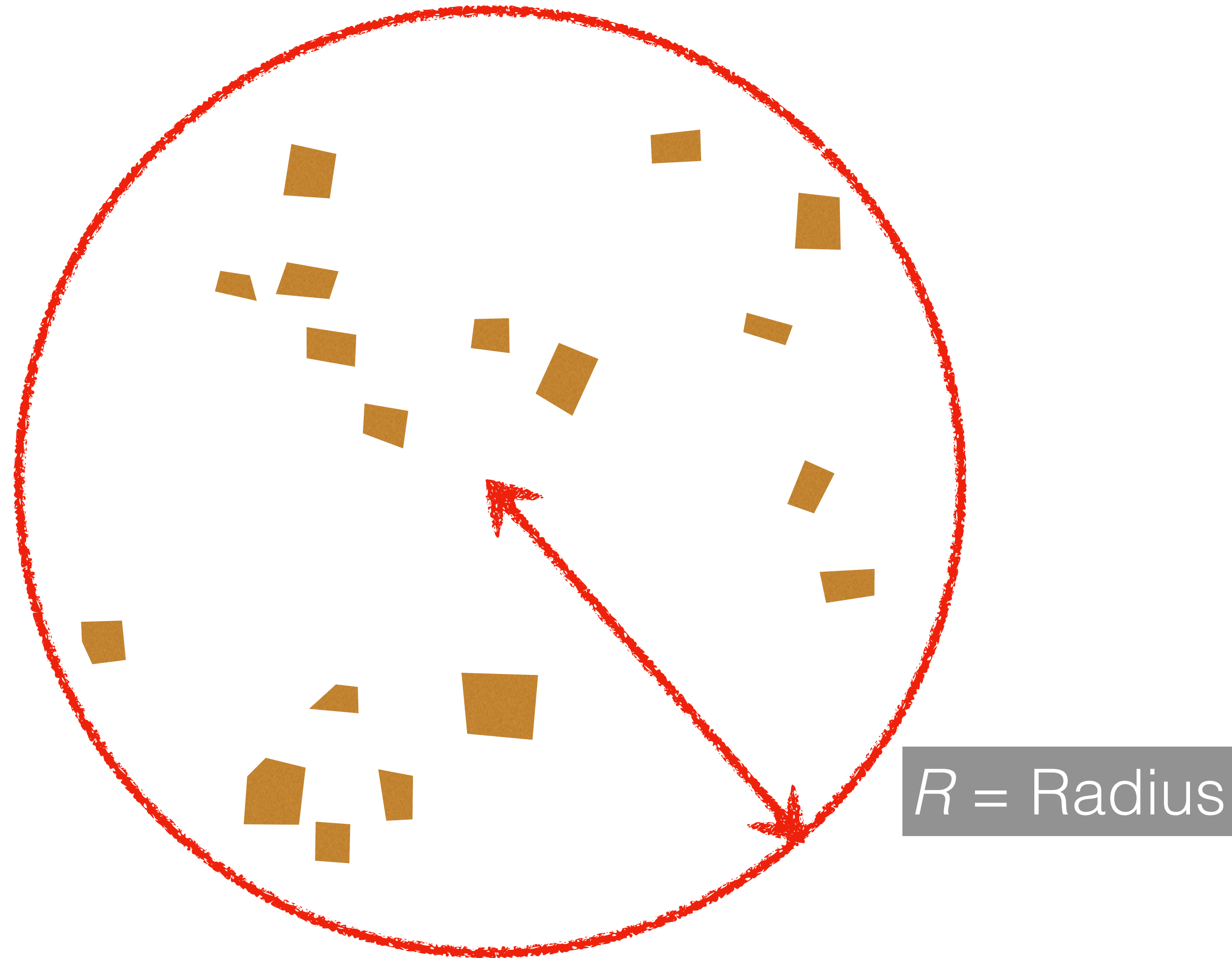
Urban Scaling Theory

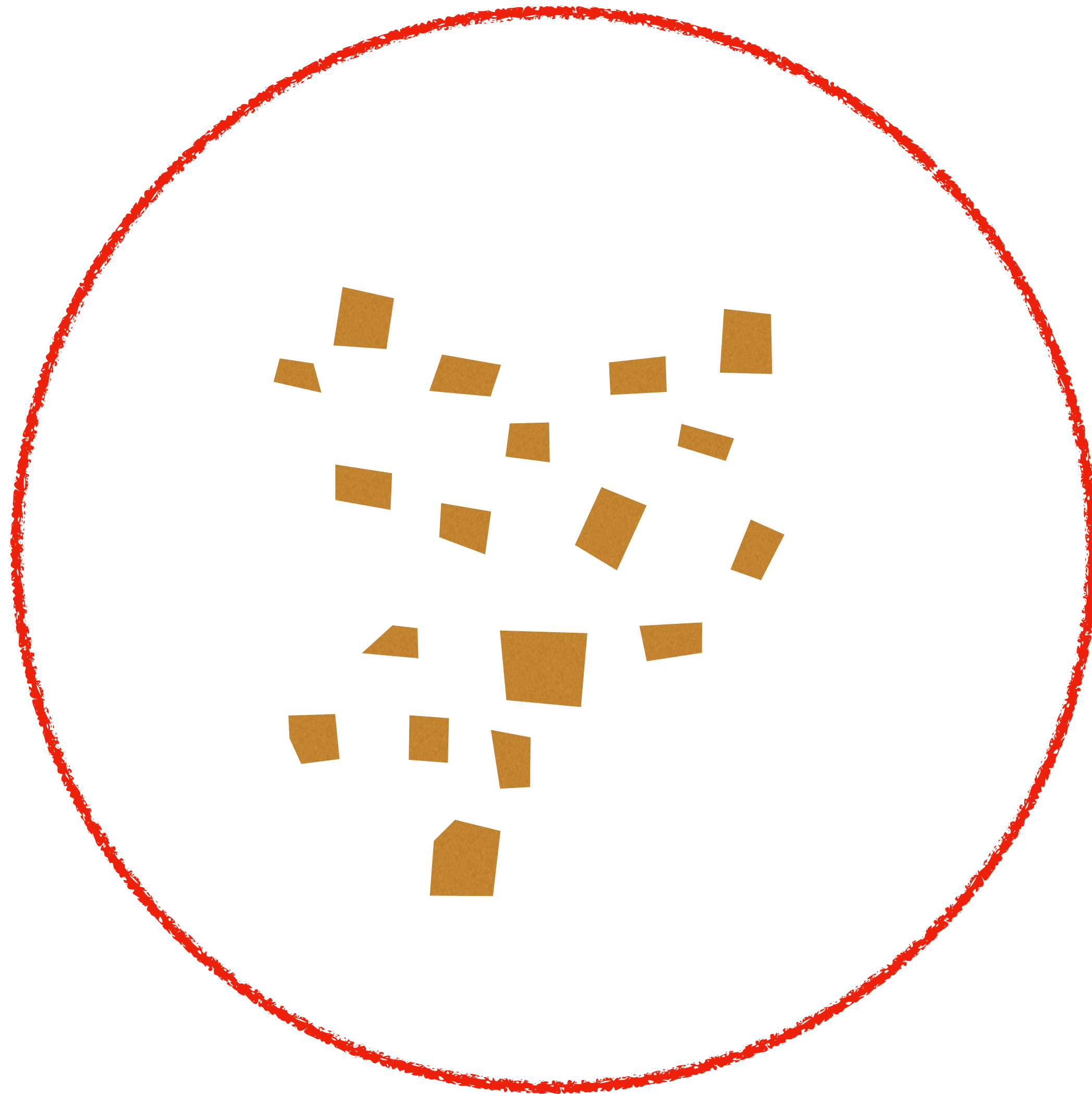


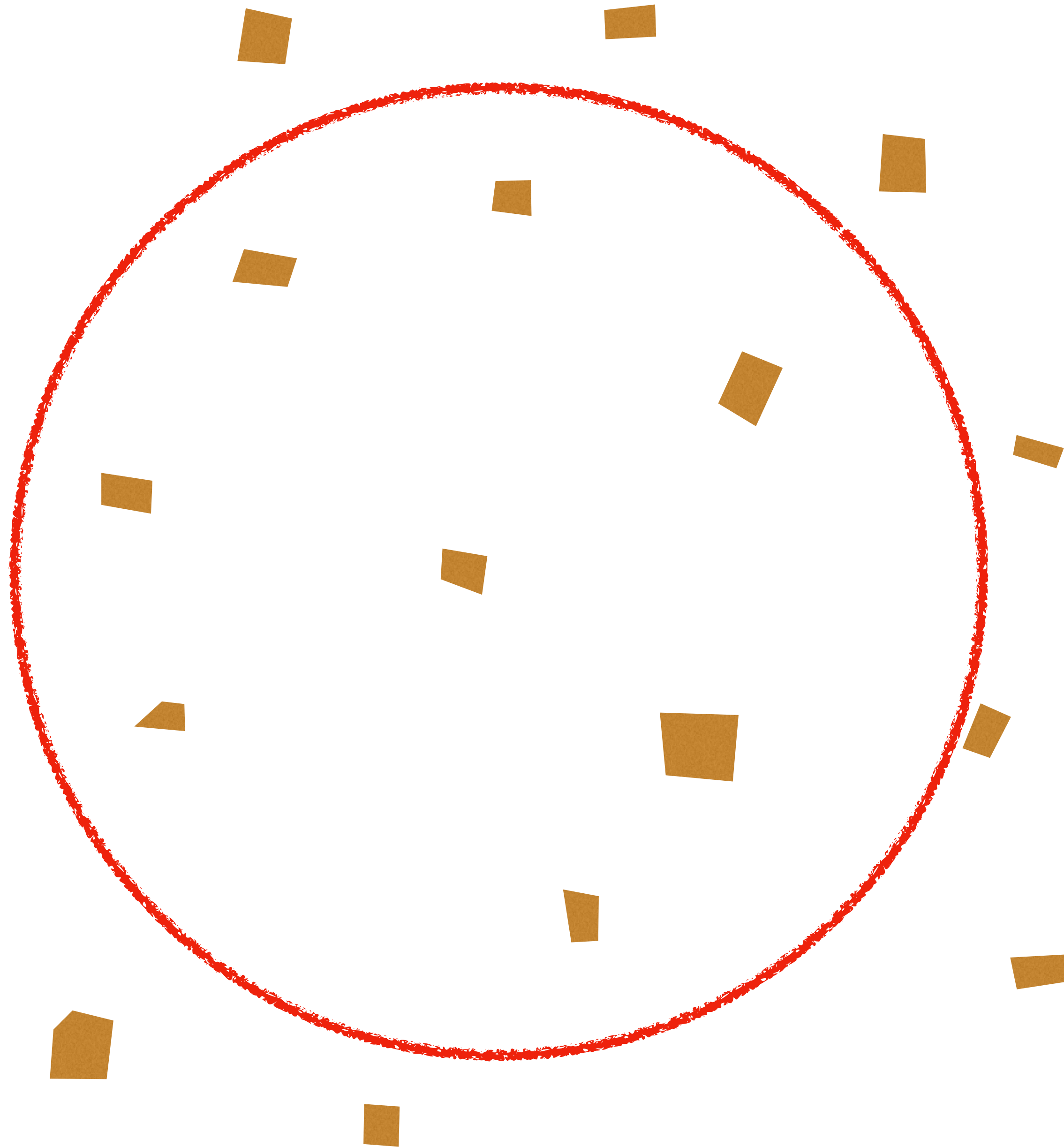


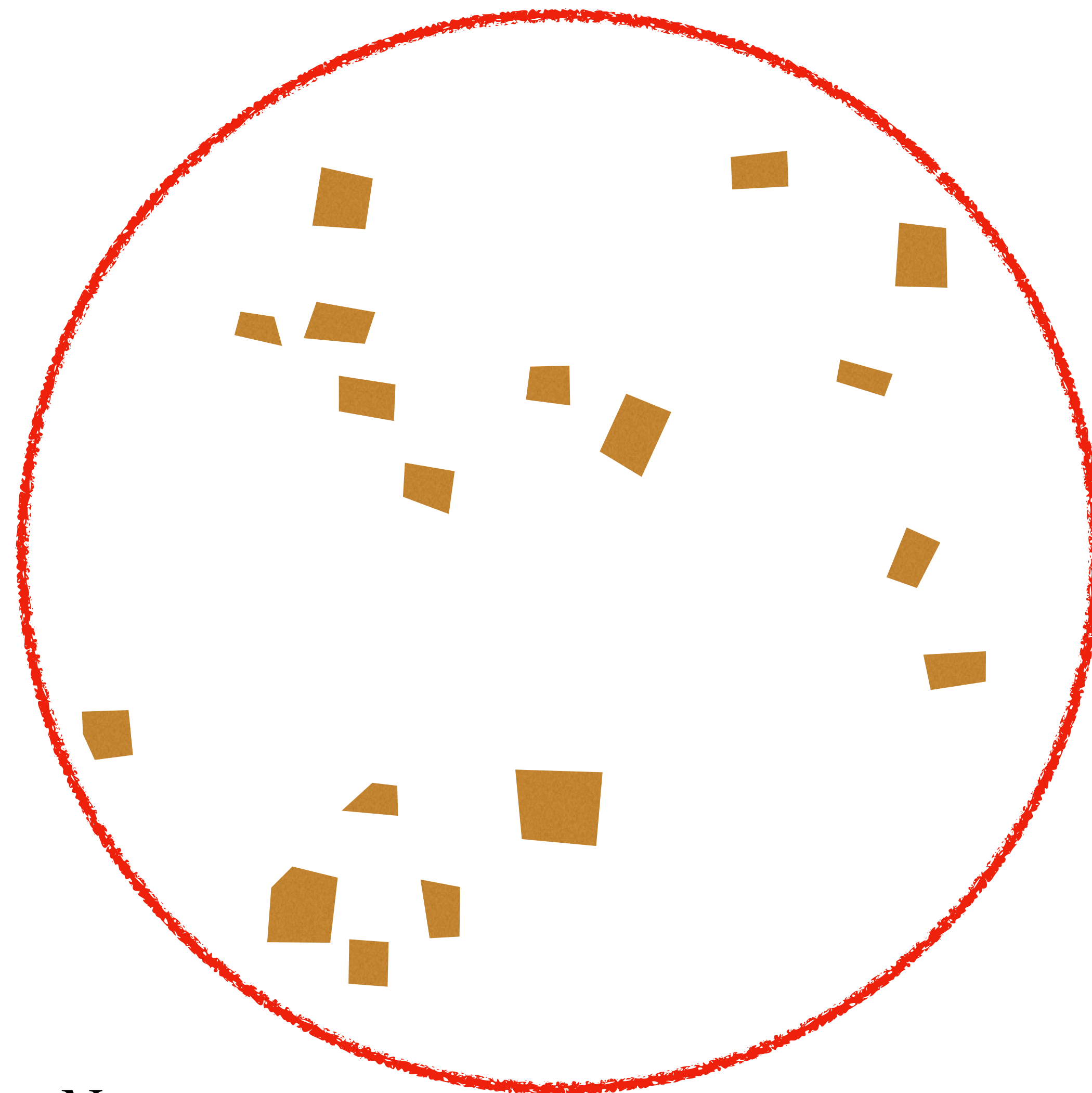
CETATEA
ĂȘNOVULUI
DIE
OSENAUER
BURG

- 1. Biserica de lemn, Vechiul Mănăstireț
- 2. Biserica de lemn, Die Wachstube
- 3. Lăzariștea de lemn, Leichenhaus
- 4. Mănăstireț de lemn, Die Mönchshaus im Bergkloster, Obergarten
- 5. Capela de lemn, Die Kapelle - 1600
- 6. Capela de lemn, Die Kapelle - 1600
- 7. Biserica de lemn, Die persianische Kirche
- 8. Biserica de lemn, Die persianische Kirche
- 9. Capela de lemn, Die Kapelle
- 10. Biserica de lemn, Die Kirche









$$A^{3/2} = \frac{\sqrt{\pi}G}{c_{T_0}}N$$

$$G\frac{N}{A} = c_{T_0}\left(\frac{A}{\pi}\right)^{1/2}$$

For Circle:

$$A = \pi R^2$$

$$G\frac{N}{A} = \text{benefit}$$

social interactions

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$$\text{cost} = c_{T_0}R = \frac{c_{T_0}}{\sqrt{\pi}}A^{1/2}$$

movement

This gets us two good things:

“City” Area:

$$A(N) = \left(\frac{\sqrt{\pi} G}{c_{T_0}} \right)^{\frac{2}{3}} N^{\frac{2}{3}}$$

sublinear

$$1 - \delta = \frac{2}{3}$$

Total
Socioeconomic
Outputs:

$$Y(N) = G \frac{N^2}{A} = \left(\frac{G^{\frac{1}{2}} c_{T_0}}{\sqrt{\pi}} \right)^{\frac{2}{3}} N^{\frac{4}{3}}$$

superlinear

$$1 + \delta = \frac{4}{3}$$

Note also different G , c_{T_0} dependences

quality of interactions

transportation costs

Results in:

$$\delta = \frac{1}{3}$$

too big !

To get closer to the right answer need:

A better model of social interactions over built space

To understand the general characteristics of urban spaces

To better compute costs of transportation and land rents (better than in economics)

To understand fundamental constraints on human interactions