



Connecting the urban technological scene: examining formal and informal networks within startup clusters

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Ministry of Science
and Higher Education

Republic of Poland



Diamentowy
Grant



Technological startups

unicorn

flexibility

innovation

Technological startups

progress

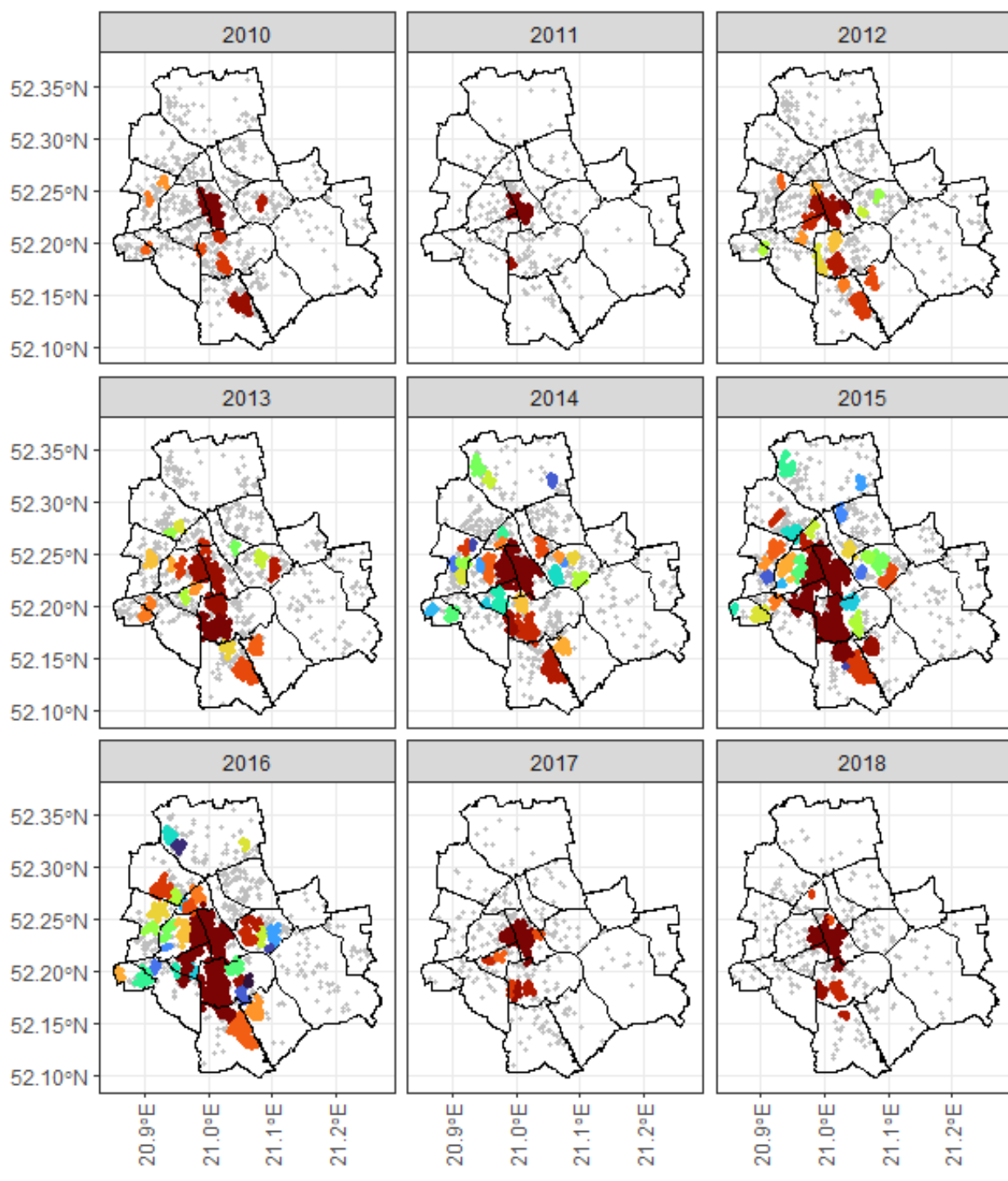
growth

Technological startups

A dimly lit office space with a man standing and presenting to a group of people seated around a table with laptops. The scene is set in a modern, industrial-style office with large windows, plants, and a clock on the wall. The overall atmosphere is professional and collaborative.

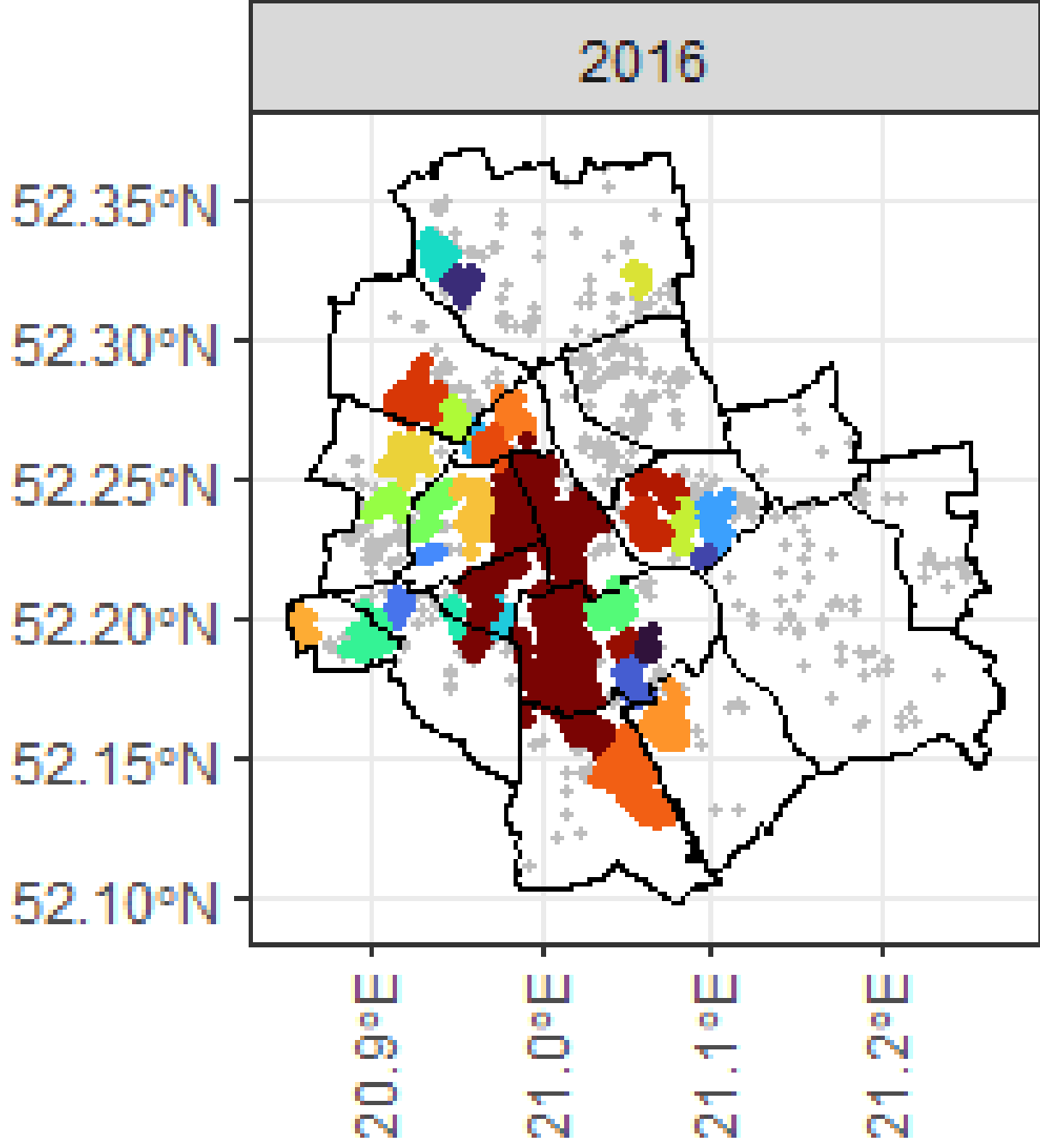
flexibility

location...?



Kubara, M. Spatiotemporal localisation patterns of technological startups: the case for recurrent neural networks in predicting urban startup clusters. *Ann Reg Sci* (2023). <https://doi.org/10.1007/s00168-023-01220-7>

Clustering



Kubara, M. Spatiotemporal localisation patterns of technological startups: the case for recurrent neural networks in predicting urban startup clusters. *Ann Reg Sci* (2023). <https://doi.org/10.1007/s00168-023-01220-7>

Clustering

—

- Stronger competition
- Ideas draining
- Higher costs of office rental (especially in the center)

+

MAR externalities
Knowledge spillovers
Access to qualified labor

Clustering

Key for
creating
innovation

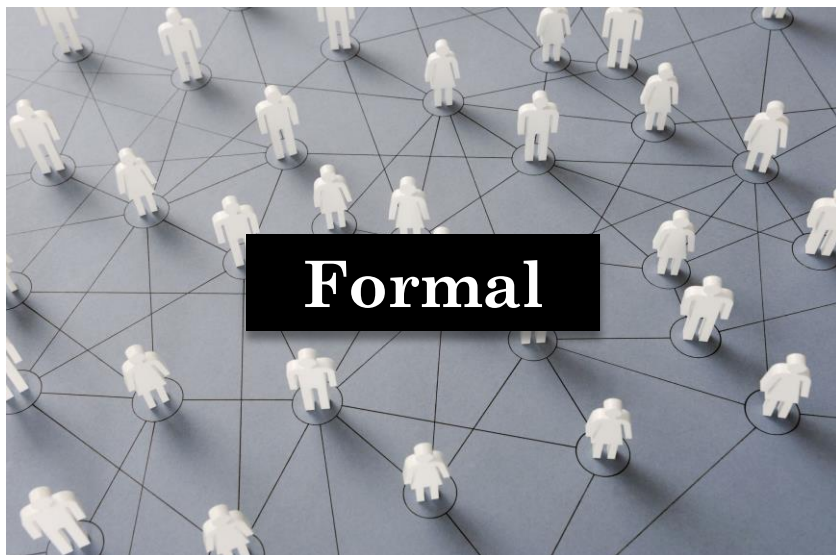
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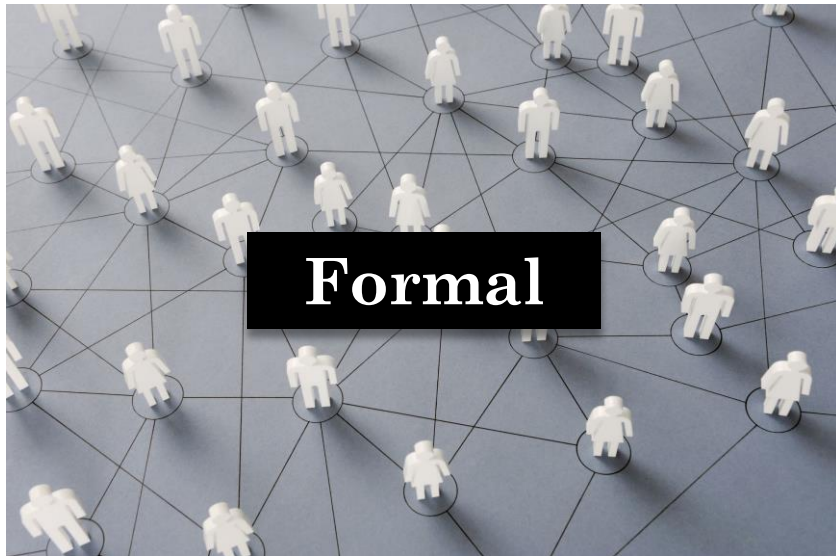
+

MAR externalities
Knowledge spillovers
Access to qualified labor

Connections



Connections



Formal level
Common stakeholders
Shared board members
Corporate groups



Interactions between employees
Face to face knowledge sharing
Intangible (difficult to measure)
Core of the learning mechanism
(agglomeration effects)

A dimly lit office or meeting room. In the foreground, a man in a dark t-shirt and pants stands on the left, looking towards a group of people seated at a long table. The people are engaged in work, with some looking at laptops. The room has large windows in the background, some indoor plants, and a clock on the wall. The overall atmosphere is professional and collaborative.

1) Are the technological startups connected through formal or informal ties?

2) What do the startups do to stay connected to the knowledge flows within cities?

Sample and methods

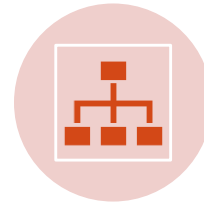
- Analysis of 666 tech companies founded in 2016 in Warsaw, Poland
- Company data from ORBIS + REGON & KRS to improve quality
- Ownership structure and stakeholder data from KRS
- Social Network Analysis (SNA) method to describe connections
 - Formal connections – directly from KRS → connections between companies and stakeholders
 - Informal connections – how to measure?
 - proxy by spatial neighborhood (W matrix on points)

5 dimensions of proximity



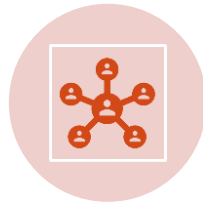
Cognitive

Key for sharing tacit knowledge



Organizational

Corporate ties and formal arrangements



Social

Socially embedded relations at micro-level



Institutional

Sharing institutions (culture, political system, etc.)

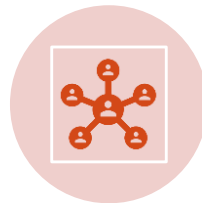


Geographical

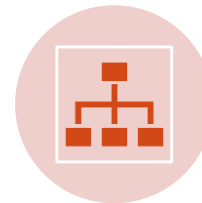
5 dimensions of proximity



Cognitive



**Social
INFORMAL**



**Organizational
FORMAL**



Institutional



Geographical **Facilitator of interactions (providing some level of similarity)**

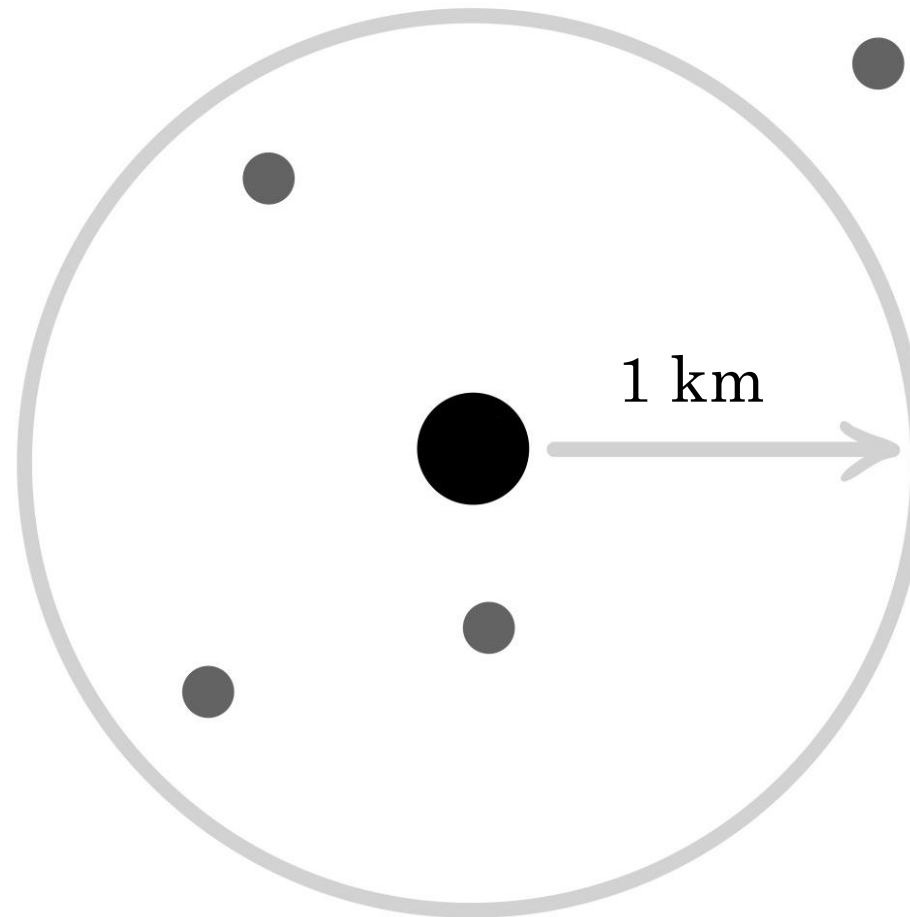
- ✓ “Knowledge externalities are geographically bounded”
- ✓ “Geographical proximity, combined with some level of cognitive proximity, is sufficient for interactive learning to take place.”
- ✓ “Short distances literally bring people together (...) and facilitate the exchange of tacit knowledge”
- ✓ “Geographical proximity is most likely to stimulate social proximity, because short geographical distances favor social interactions and trust building”

Measuring implicit informal connections

Spatial weight matrix:
1 km distance criterion
~10-15 min walk

15 min city concept
Walk during lunch break

0-1 matrix translated
to undirected graph
connections

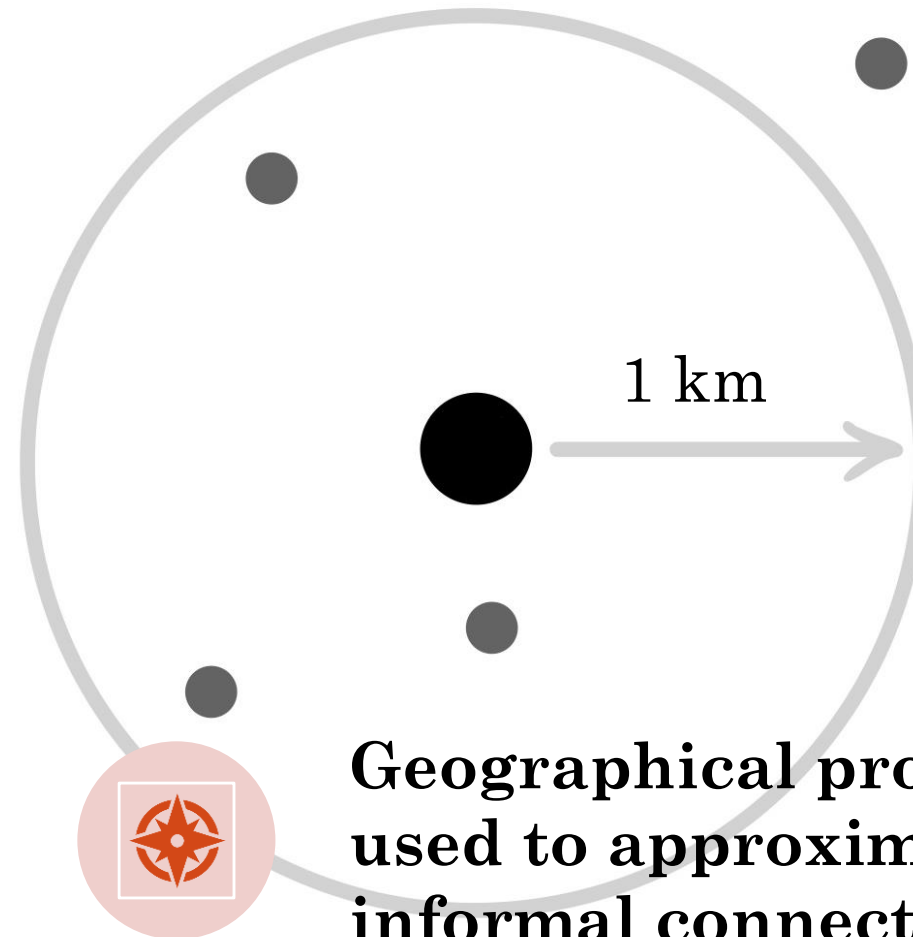


Measuring implicit informal connections

Spatial weight matrix:
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A network diagram with human figures as nodes connected by lines. The background is a dark gray color with a grid of thin black lines. At the intersections of these lines are small, light gray human figures. The figures are arranged in a way that suggests a complex network structure. The text "Formal network" is overlaid in the center in a white, serif font.

Formal network

Formal network

2447 nodes

666 startups

1587 people

194 companies (investors)

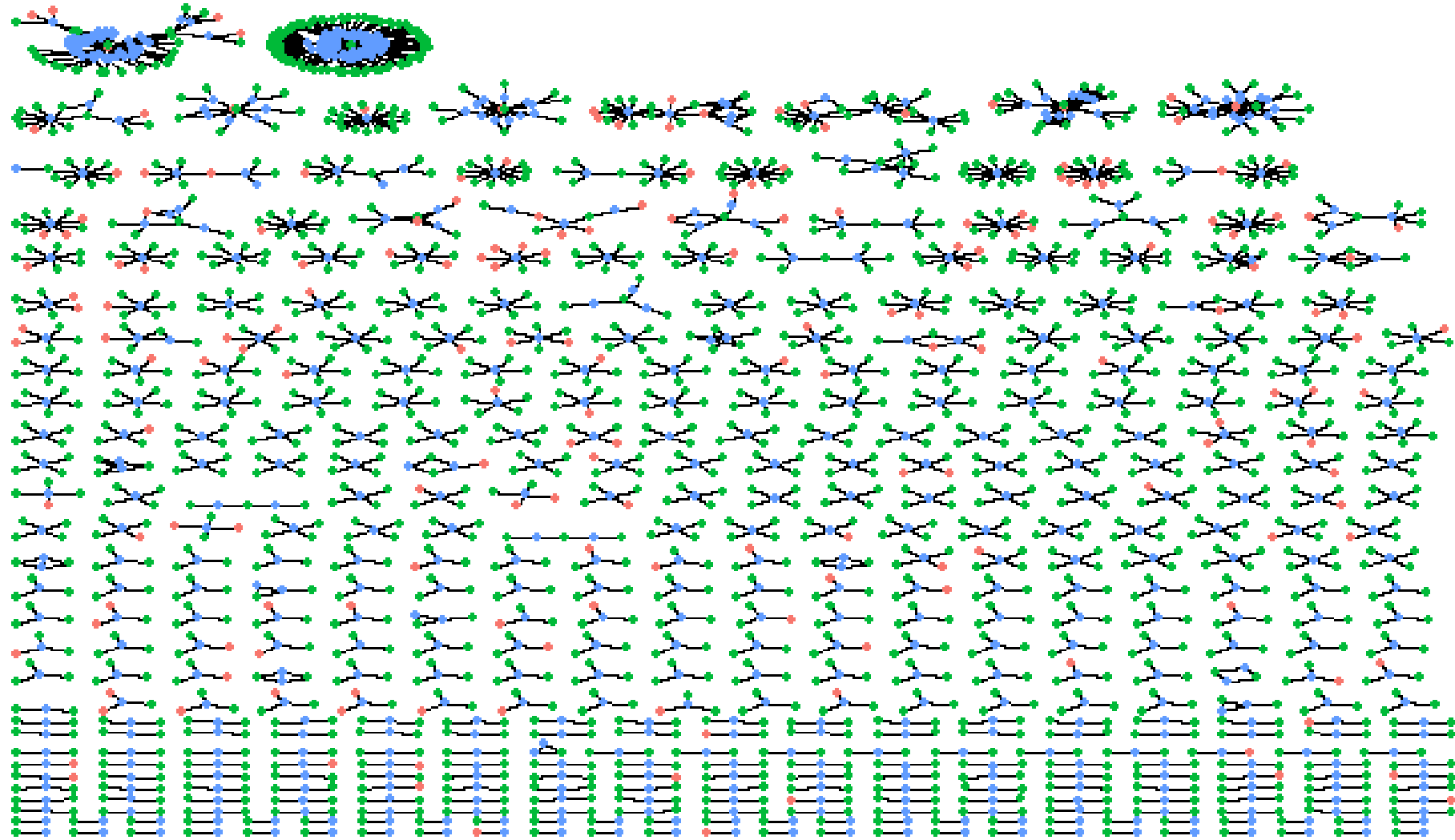
2235 edges

2142 to startups

66 from startups

27 between startups

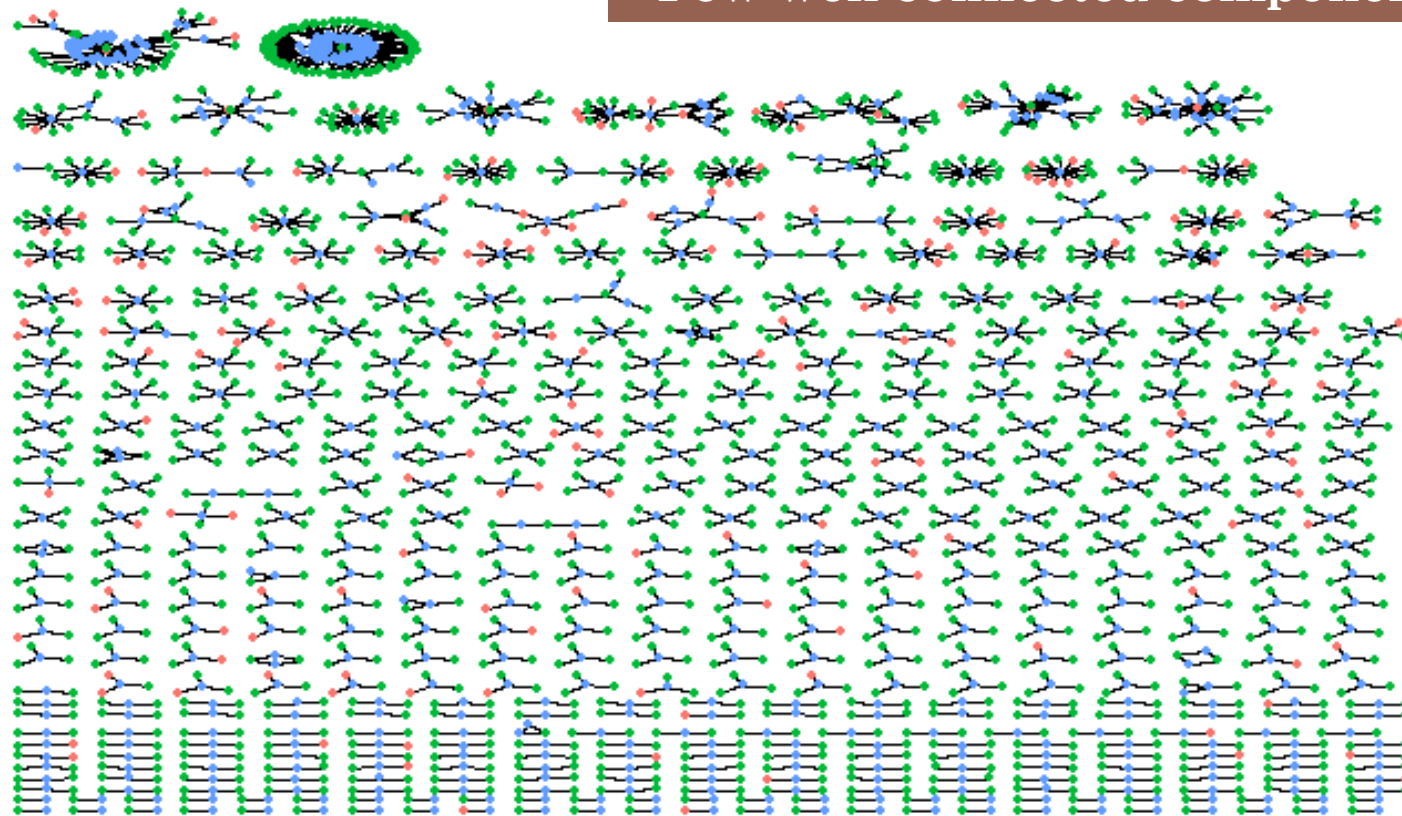
Formal connection network



Type • firm • person • startup

Formal connection network

Few well connected components



Type • firm • person • startup

2447 nodes
666 startups
1587 people
194 companies (investors)

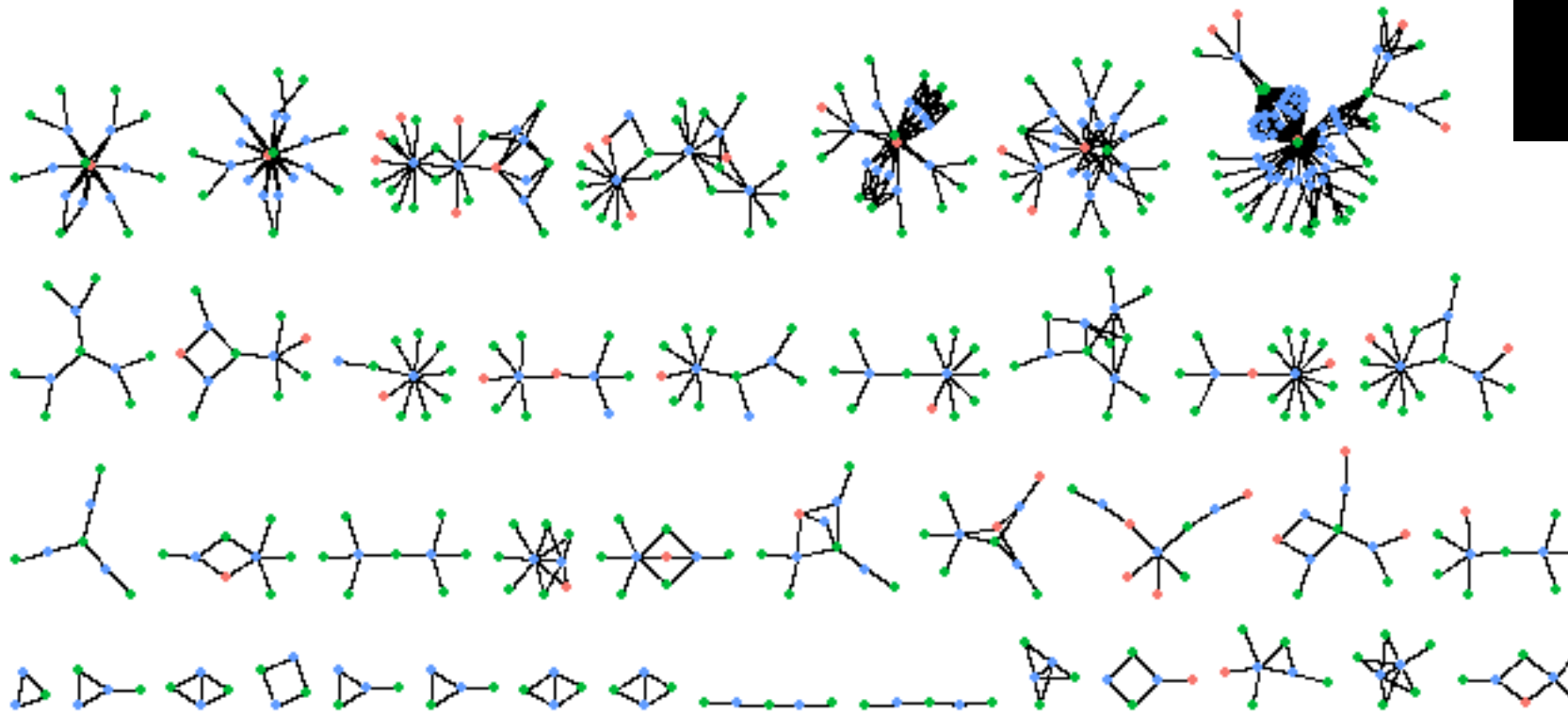
Most components with just one startup (no formal connections with peers)

Formal connection network (limited)



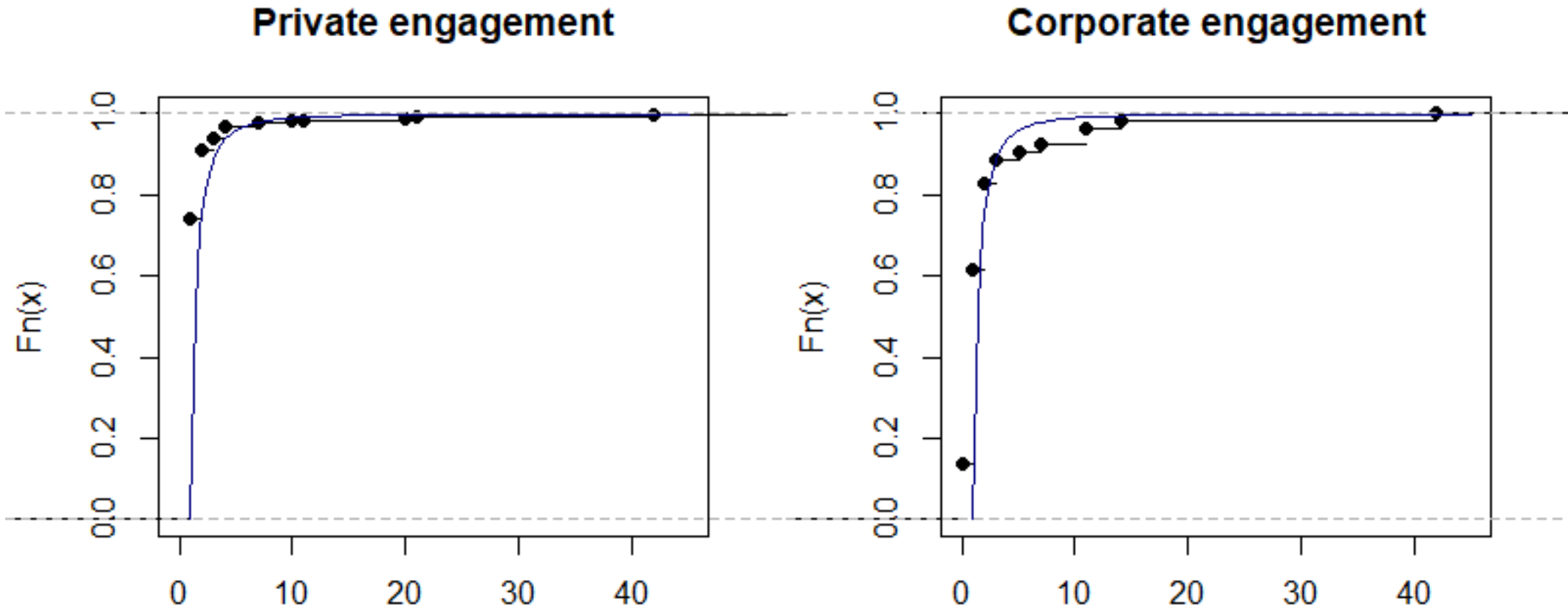
Components with at least 2 startups

633 nodes
238 startups
343 people
52 companies
(investors)



Type • firm • person • startup

Activity of investors – Pareto rule

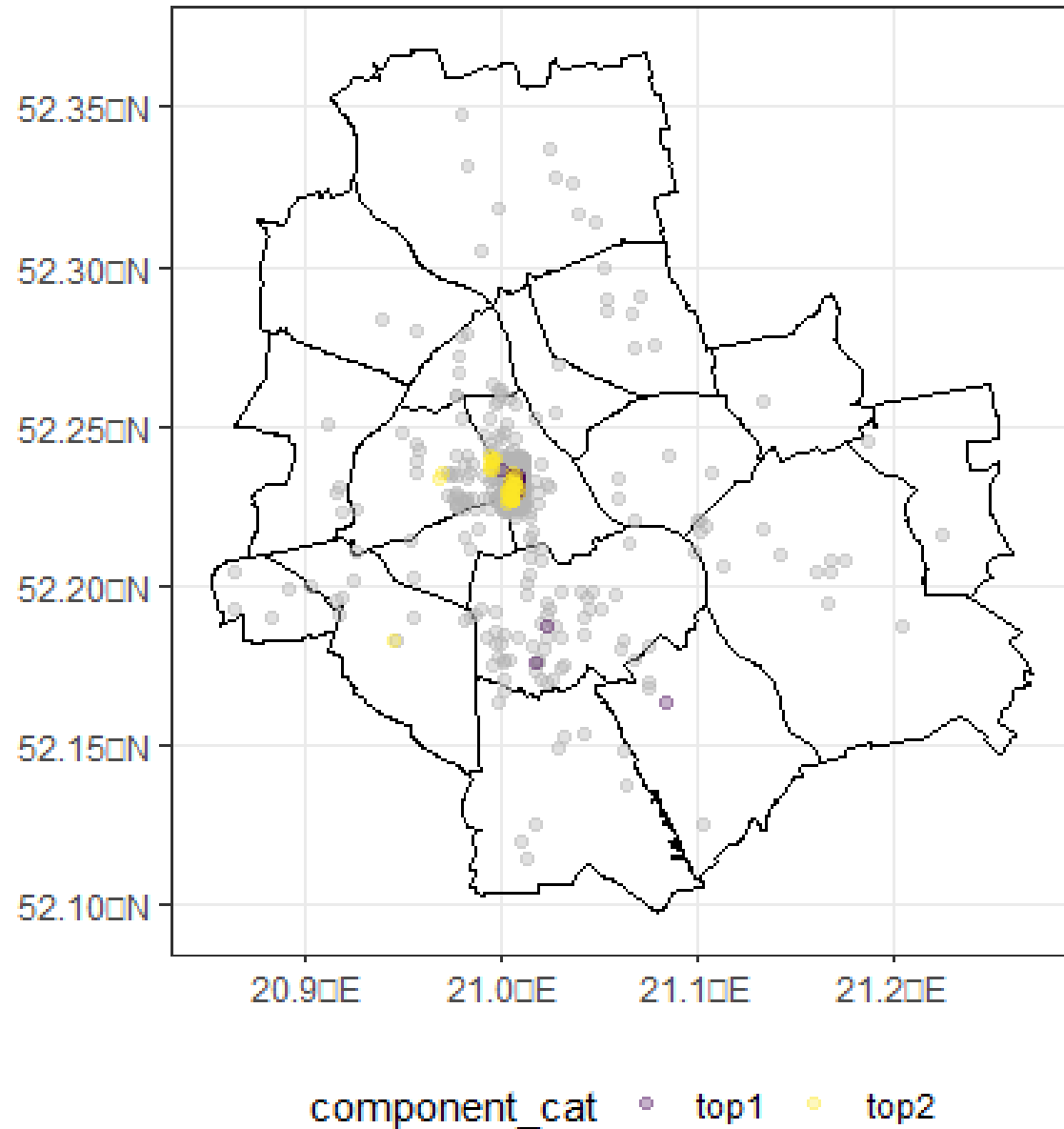


80% of connections made by (fewer) than 20% of investors

Type of formal connection	Average result after 5 years of operation		Average percentage change in value after 5 years of operation			No. of startups in a group
	Survival rate	Solvency ratio	Profit/Loss	Shareholders' funds	Total assets change	
Disconnected	92.8%	48.8%	-14.2%	58.3%	104%	428
Components with at least two startups	93.4%	61.2%	-160%	680%	394%	136
Within the two biggest formal components	99.0%	79.5%	187%	27.6%	18.4%	102

Less growth due to relatively higher level of initial funds

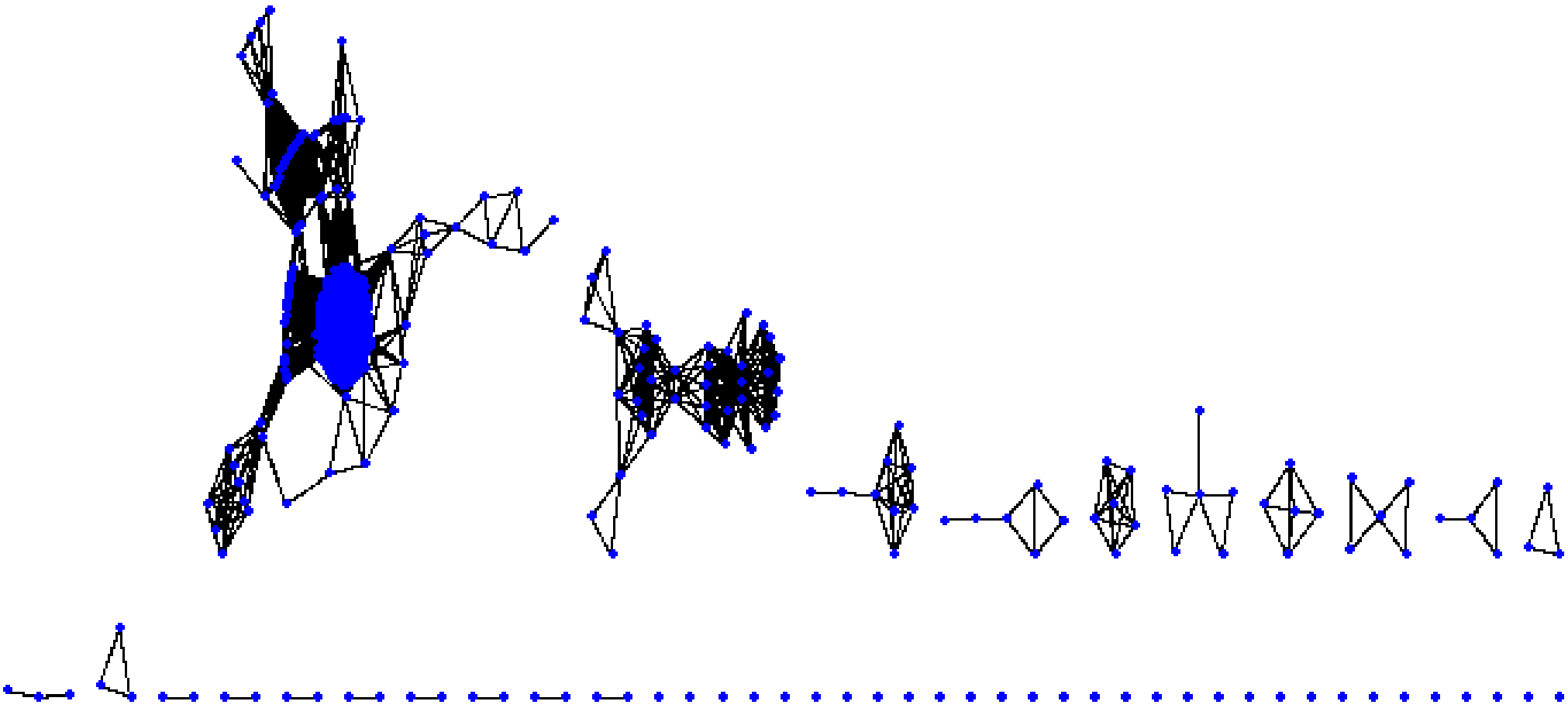
Location of two top groupings



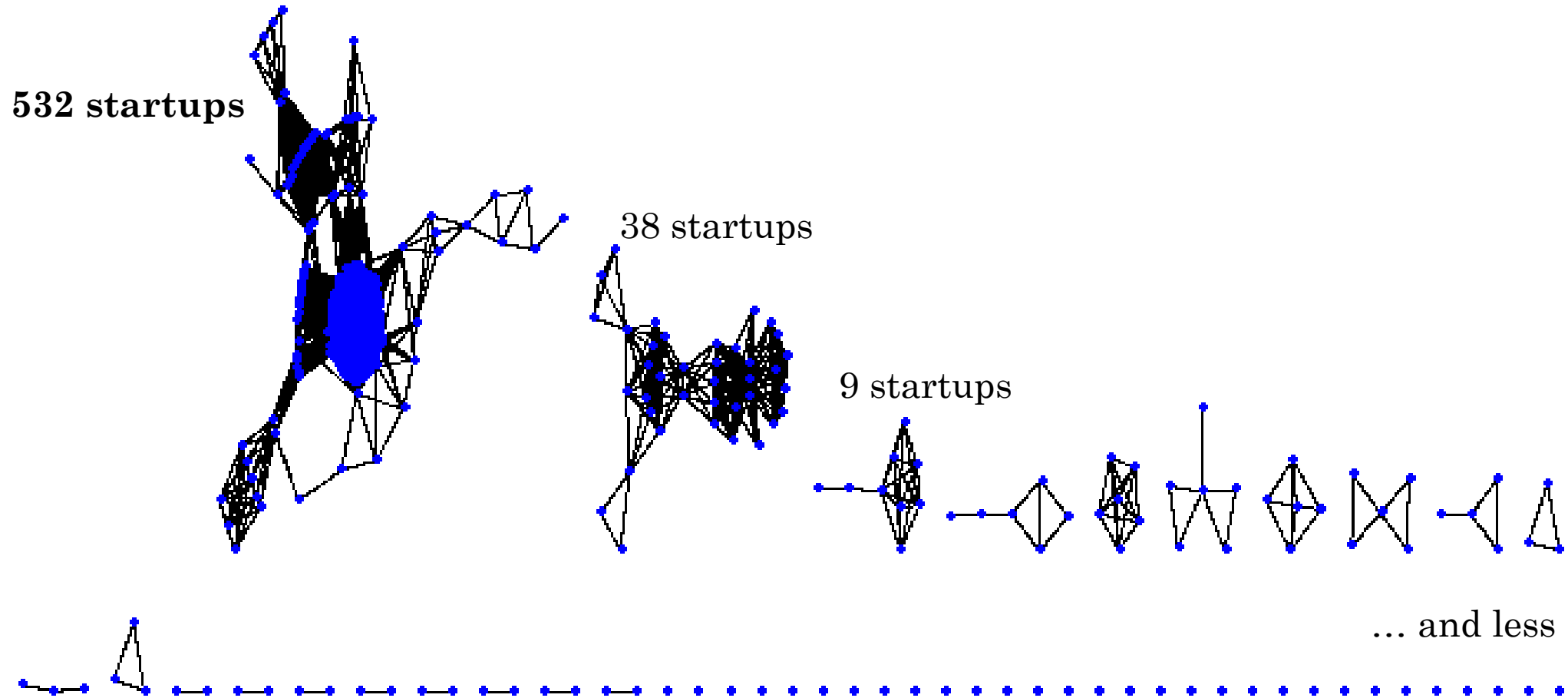
A top-down view of a wooden table with coffee, cake, and water, with the text 'Informal network' overlaid. The table is set with several coffee cups, plates of cake, and a glass of water. The text 'Informal network' is written in a large, white, serif font across the center of the image.

Informal network

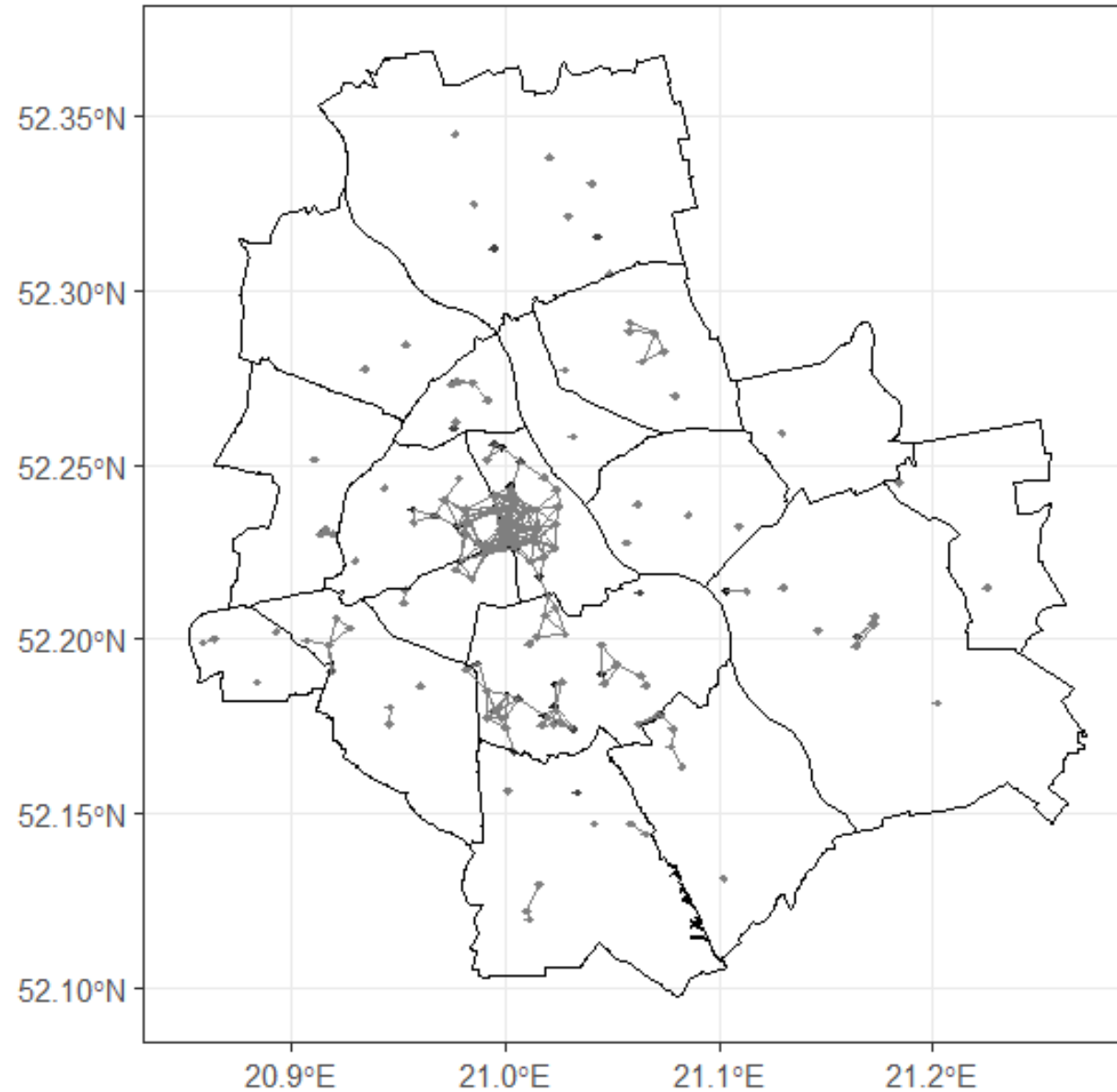
Implicit informal network



Implicit informal network



Implicit informal network - spatially



Type of formal connection	Average result after 5 years of operation		Average percentage change in value after 5 years of operation			No. of startups in a group
	Survival rate	Solvency ratio	Profit/Loss	Shareholders' funds	Total assets change	
Disconnected	88.9%	39.6%	16.1%	87.5%	37.3%	27
In smaller clusters	90.5%	45.9%	-37%	21.2%	9.1%	42
Within the two biggest informal components	93.3%	50%	-13%	61.2%	122%	359

Summary

- Formal connectedness less prevalent than informal connections
- Only 36% are formally connected with their peers
- Otherwise disconnected startups locate in proximity to the most formal connected startups to “tune in with the buzz”
- Informal connectedness allows startups to draw positive effects from their formally connected peers – it translates to higher survival rates and financial stability
- Entrepreneurial ecosystem is created by successful companies with strong investor base, that are linked by proximity to the newcomers

Thank you!

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