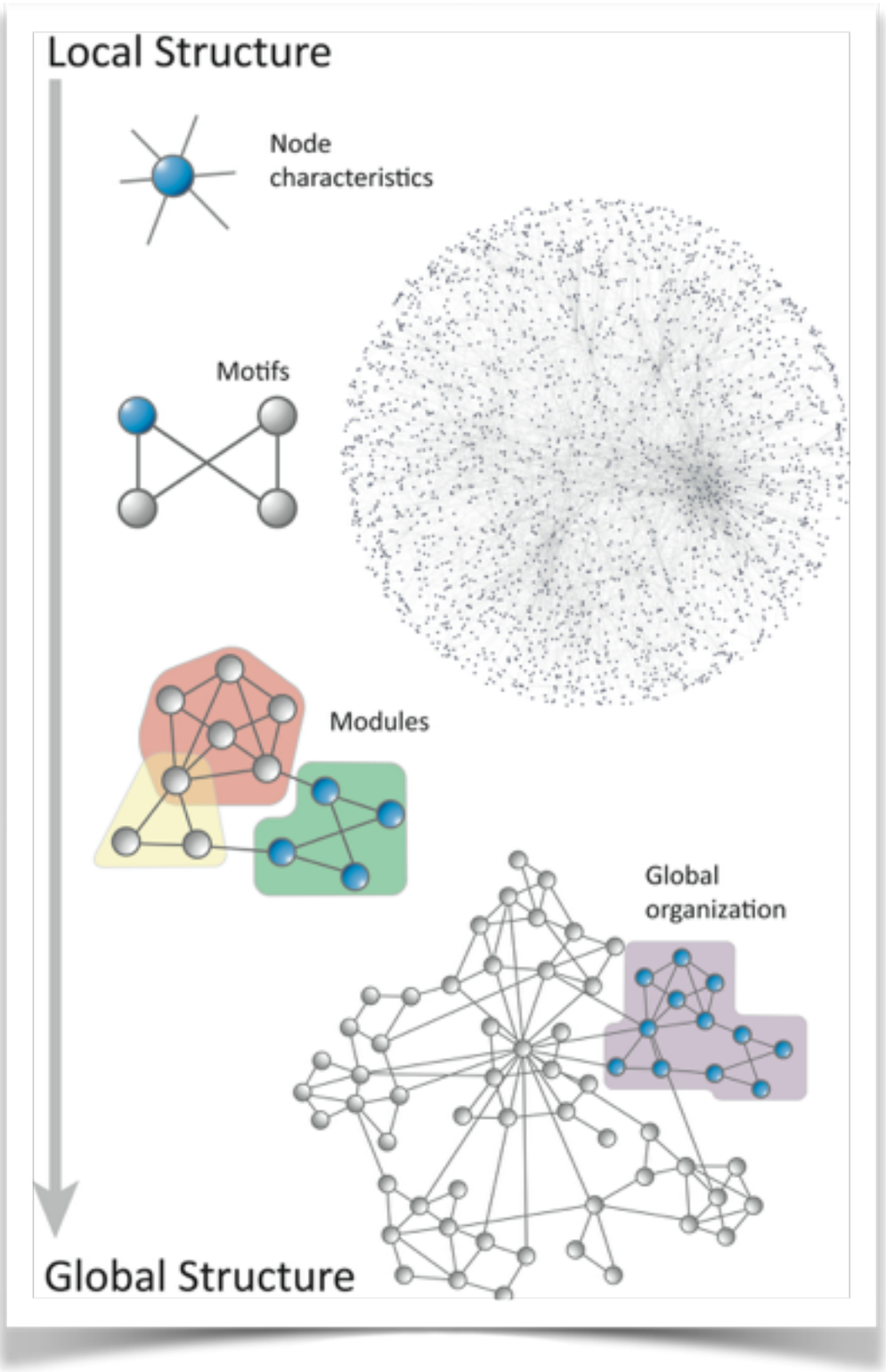
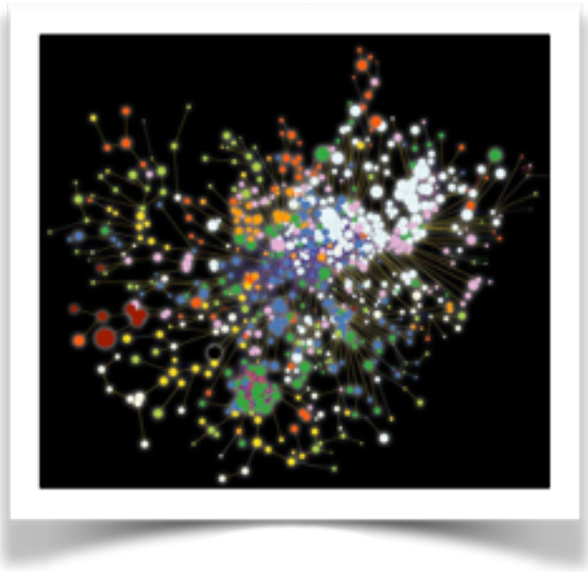
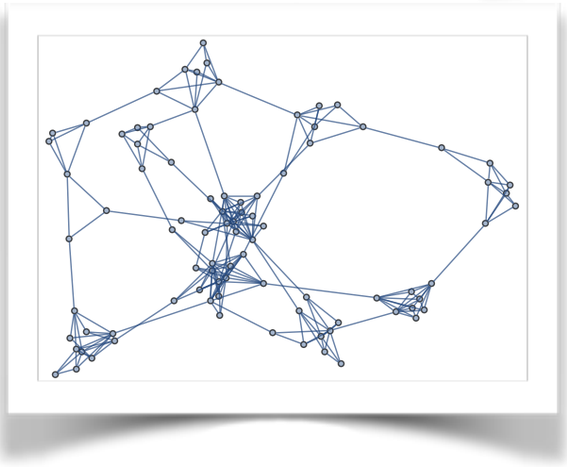
Stærke bånd & problemløsning

Sune Lehmann
- Associate Professor, DTU Compute.
- Technical University of Denmark.
- @suneman

network structure





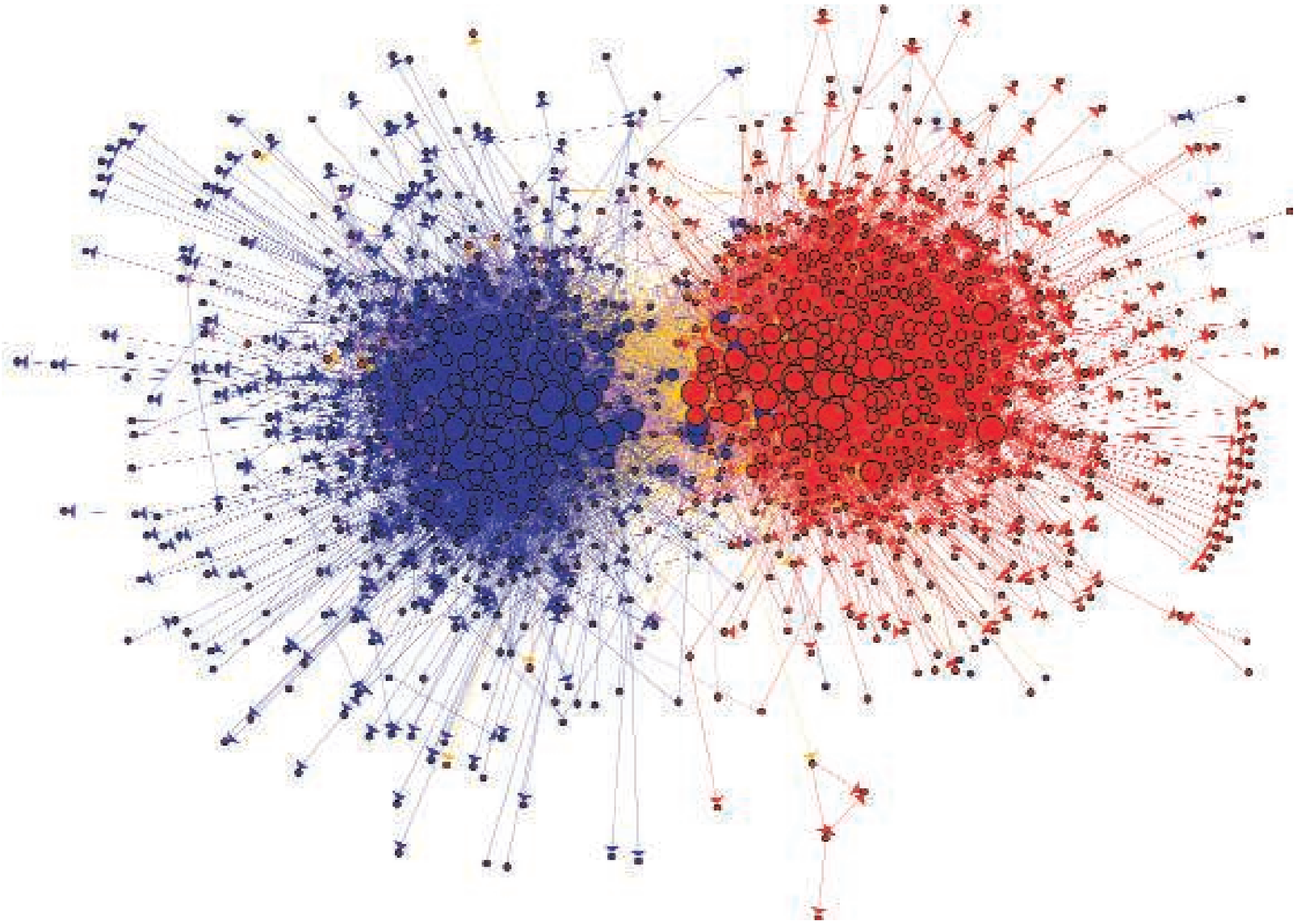


Artwork: C. Hidalgo

Computational Social Science

David Lazer,[1] Alex Pentland,[2] Lada Adamic,[3] Sinan Aral,[2,4] Albert-László Barabási,[5] Devon Brewer,[6] Nicholas Christakis,[1] Noshir Contractor,[7] James Fowler,[8] Myron Gutmann,[3] Tony Jebara,[9] Gary King,[1] Michael Macy,[10] Deb Roy,[2] Marshall Van Alstyne[2,11]

A field is emerging that leverages the capacity to collect and analyze data at a scale that may reveal patterns of individual and group behaviors.



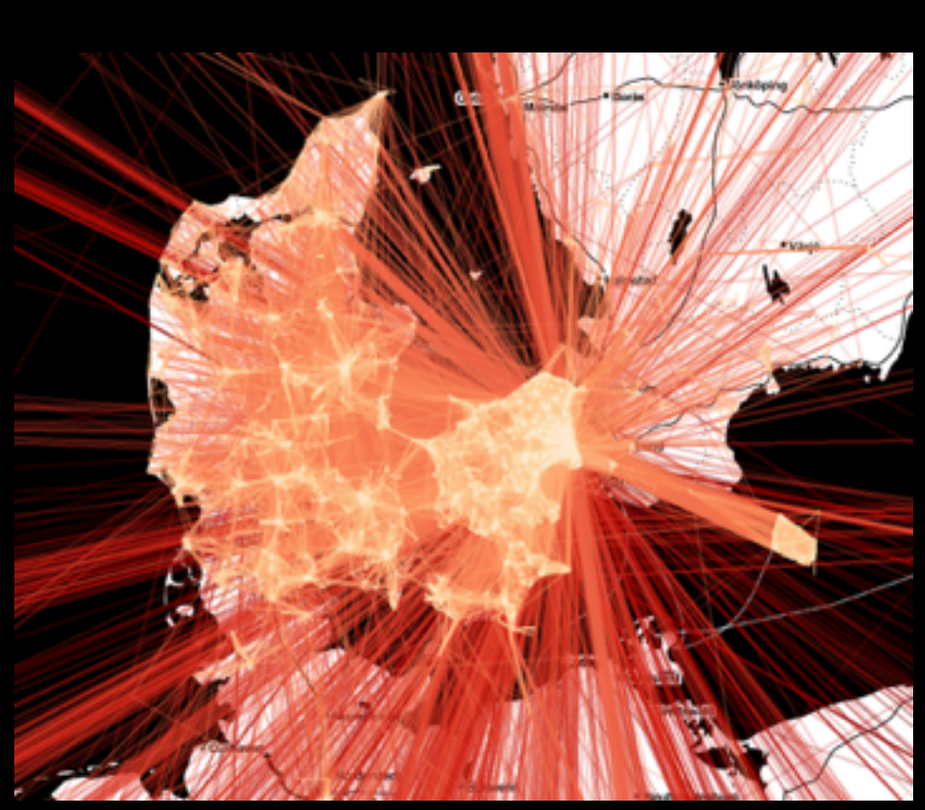

Pizza Pizza Pizza

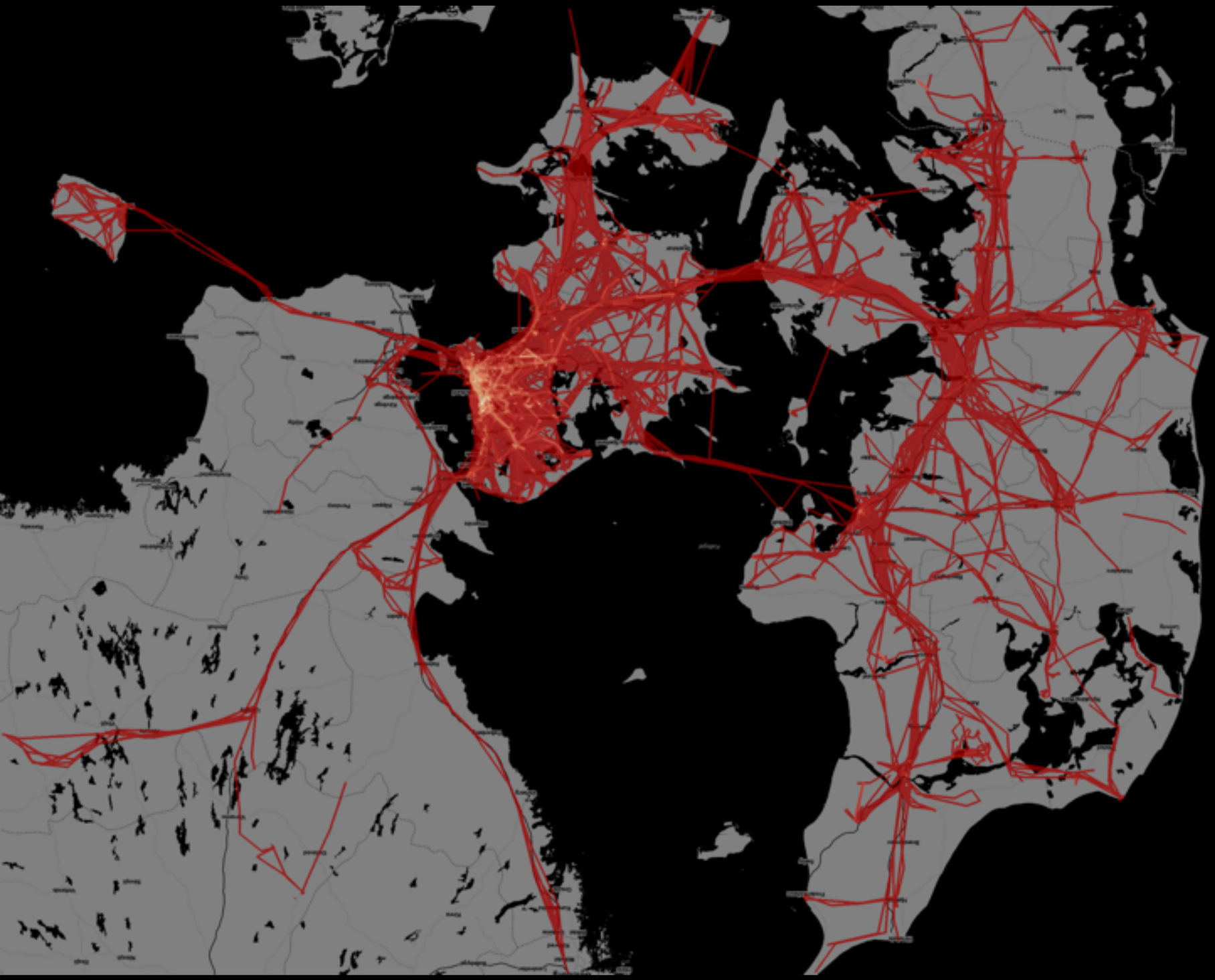
DTU Campus highlighting friends closer than 100 meters

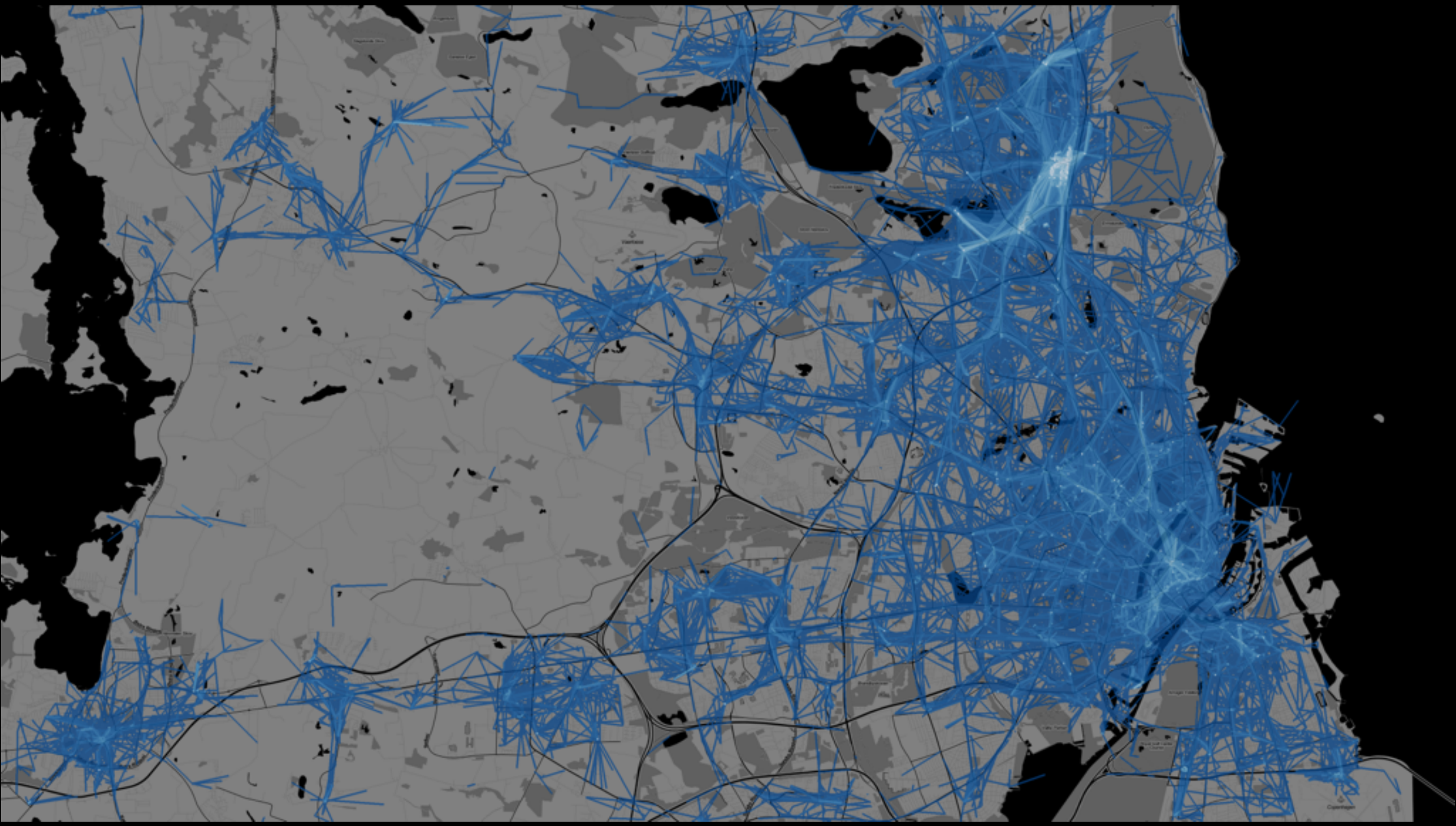
292 PEOPLE
864 FRIENDSHIPS
9 HOURS

06:09

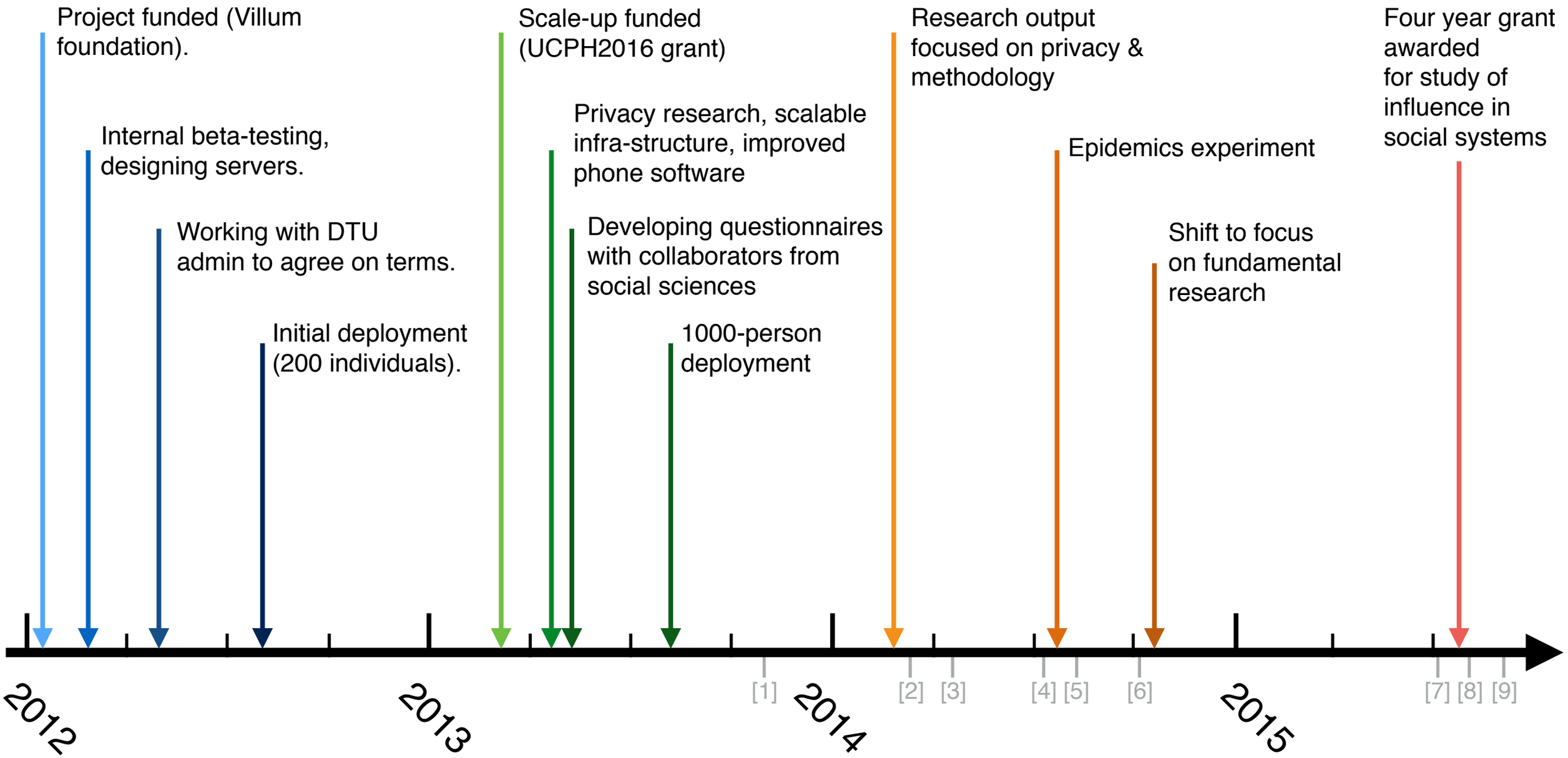

ARCTIC OCEAN
North America
NORTH ATLANTIC OCEAN
NORTH PACIFIC OCEAN
Asia
NORTH PACIFIC OCEAN
Africa
South America
SOUTH PACIFIC OCEAN
SOUTH ATLANTIC OCEAN
INDIAN OCEAN
Australia
SOUTH PACIFIC OCEAN








05:00
Lyngby Parkkirkegård
Lyngby Stadion



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[6]. Cuttone, A., Lehmann, S., & Larsen, J. E. (2014, September). Inferring human mobility from sparse low accuracy mobile sensing data. In Proceedings of the 2014 ACM International Joint Conference on Pervasive and Ubiquitous Computing: Adjunct Publication (pp. 995-1004). ACM.
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PLOS ONE

Measuring Large-Scale Social Networks with High Resolution

Arkadiusz Stopczynski[1]*, Vedran Sekara[1], Piotr Sapiezynski[1], Andrea Cuttone[1], Mette My Madsen[3], Jakob Eg Larsen[1], Sune Lehmann[1,2]

1 DTU Compute, Technical University of Denmark, Kgs. Lyngby, Denmark, **2** The Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark, **3** Department of Anthropology, University of Copenhagen, Copenhagen, Denmark

Abstract

This paper describes the deployment of a large-scale study designed to measure human interactions across a variety of communication channels, with high temporal resolution and spanning multiple years—the Copenhagen Networks Study. Specifically, we collect data on face-to-face interactions, telecommunication, social networks, location, and background information (personality, demographics, health, politics) for a densely connected population of 1 000 individuals, using state-of-the-art smartphones as social sensors. Here we provide an overview of the related work and describe the motivation and research agenda driving the study. Additionally, the paper details the data-types measured, and the technical infrastructure in terms of both backend and phone software, as well as an outline of the deployment procedures. We document the participant privacy procedures and their underlying principles. The paper is concluded with early results from data analysis, illustrating the importance of multi-channel high-resolution approach to data collection.

Citation: Stopczynski A, Sekara V, Sapiezynski P, Cuttone A, Madsen MM, et al. (2014) Measuring Large-Scale Social Networks with High Resolution. PLoS ONE 9(4): e95978. doi:10.1371/journal.pone.0095978

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Competing Interests: The authors have declared that no competing interests exist.

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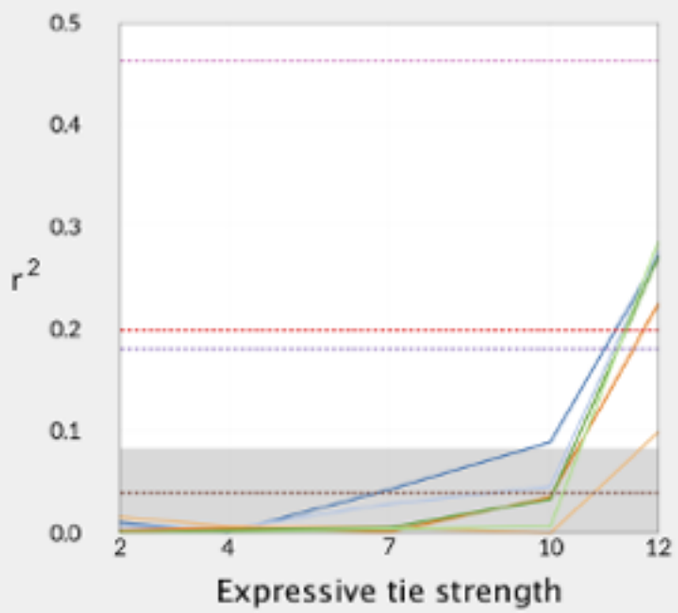
stærke bånd

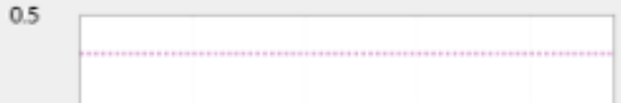
Why networking doesn't work?

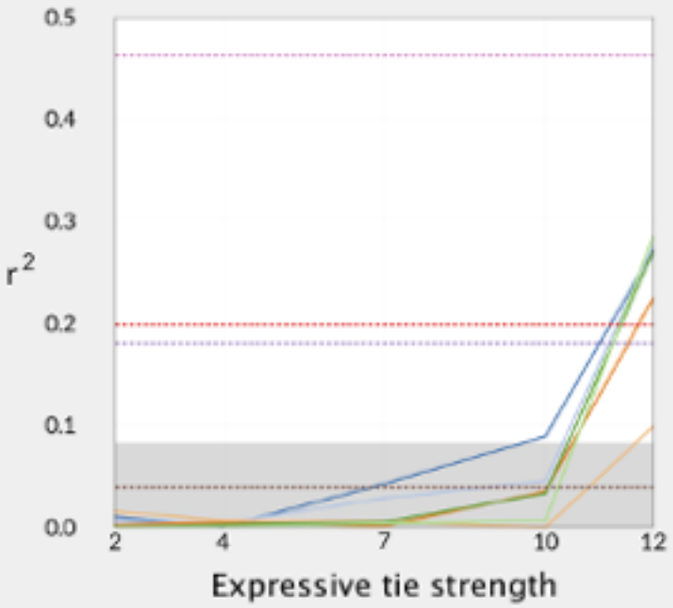
Yves-Alexandre de Montjoye, Arkadiusz Stopczynski, Erez Shmueli, Alex 'Sandy" Pentland, and Sune Lehmann

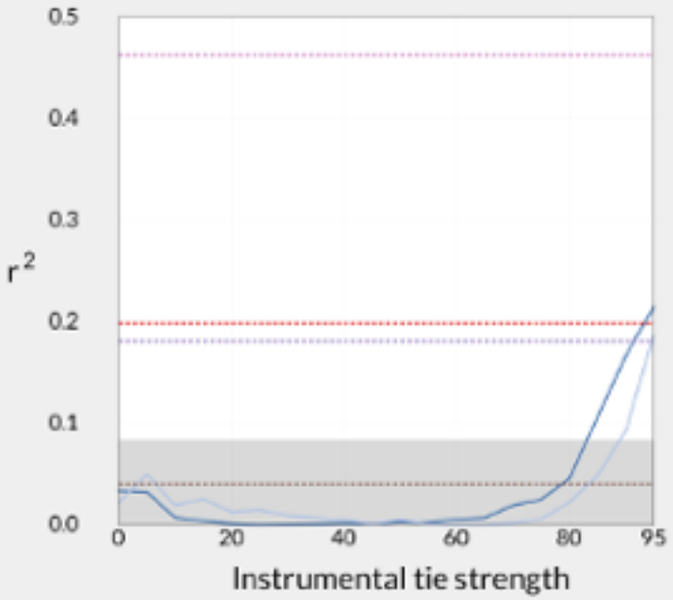
"**Networking**," creating social ties in the workplace, generally increases **performance**. It is common career advice for executives, entrepreneurs, and academics. More companies are investing in common spaces and team building events to support networking.



But networking doesn't seem to improve **performance in competitive environments**. Our experiment at a large western university showed that when faced with a complex problem, the **weak ties of team members did not have any effect** on their performance. Frequency of interactions with the people we'd consider to be acquaintances, and even with those we'd would consider friends, did not help your performance.





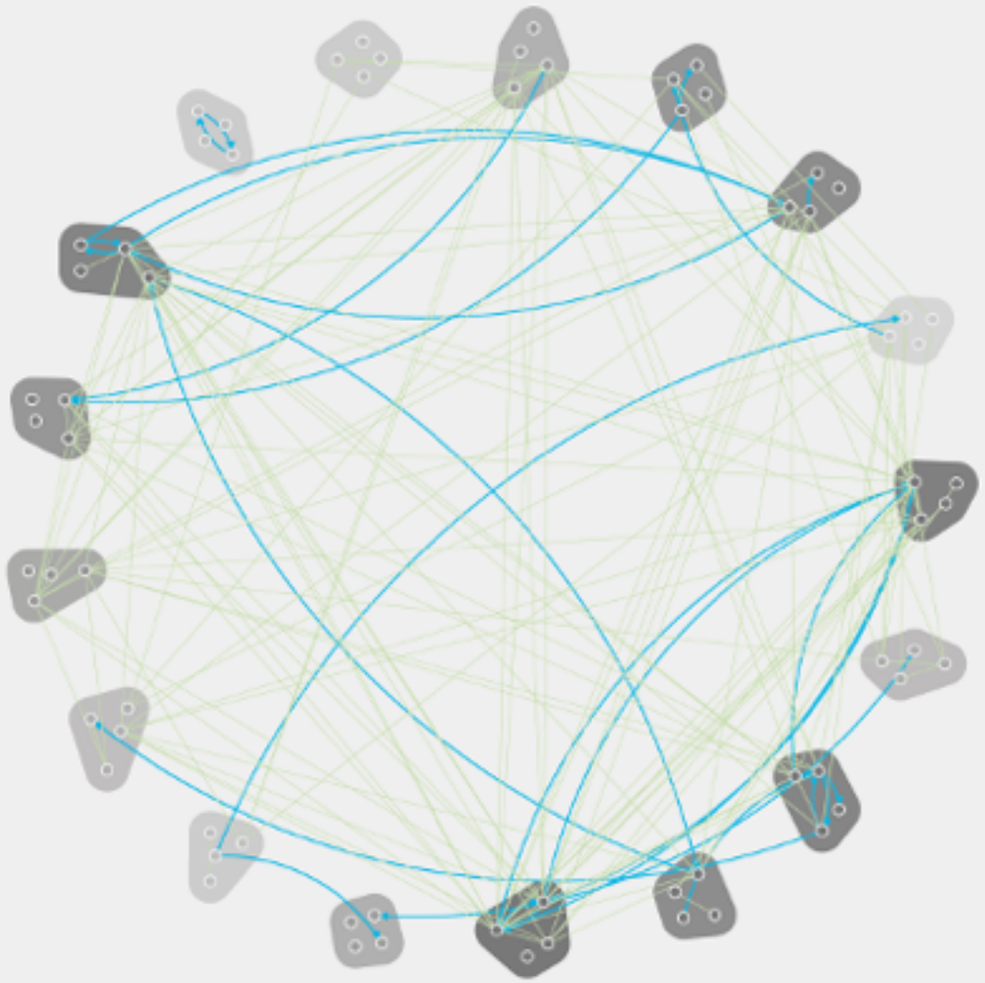


But networking doesn't seem to improve **performance in competitive environments**. Our experiment at a large western university showed that when faced with a complex problem, the **weak ties of team members did not have any effect** on their performance. Frequency of interactions with the people we'd consider to be acquaintances, and even with those we'd would consider friends, did not help your performance.

Network Measures
- Mean/Max team degree
- Mean/Max team in-degree
- Mean/Max team out-degree

A Priori Competencies
- Self-evaluated technical competencies
- Measured technical competencies
- Personality

A Posteriori Performance
- Self-assessed team performance



***Strongest expressive** (in blue) and **instrumental** (in green) ties.*
Color saturation, where darker is higher, is the performance of the team

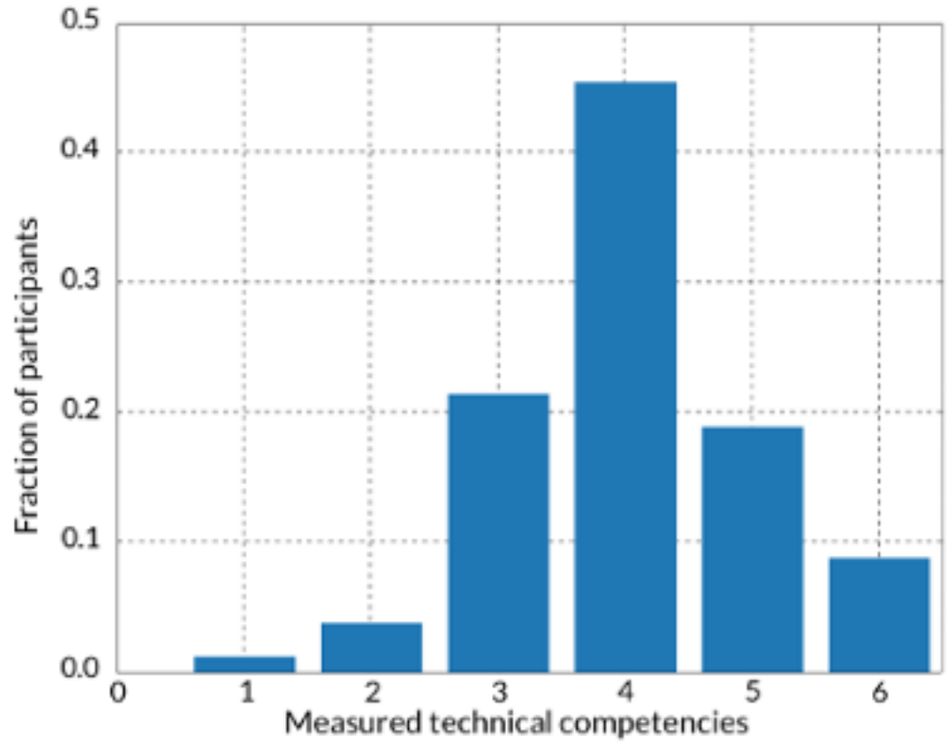
Does this mean that ties don't matter? Not quite. When we examine the network of people's **strongest ties, there is a large effect on performance**. This means that only your strongest expressive and instrumental ties — the people closest to you, and with whom you spend the most time — impact your performance in competitive environments.

Further a team's **strongest ties explain its performance better than the**

environments.

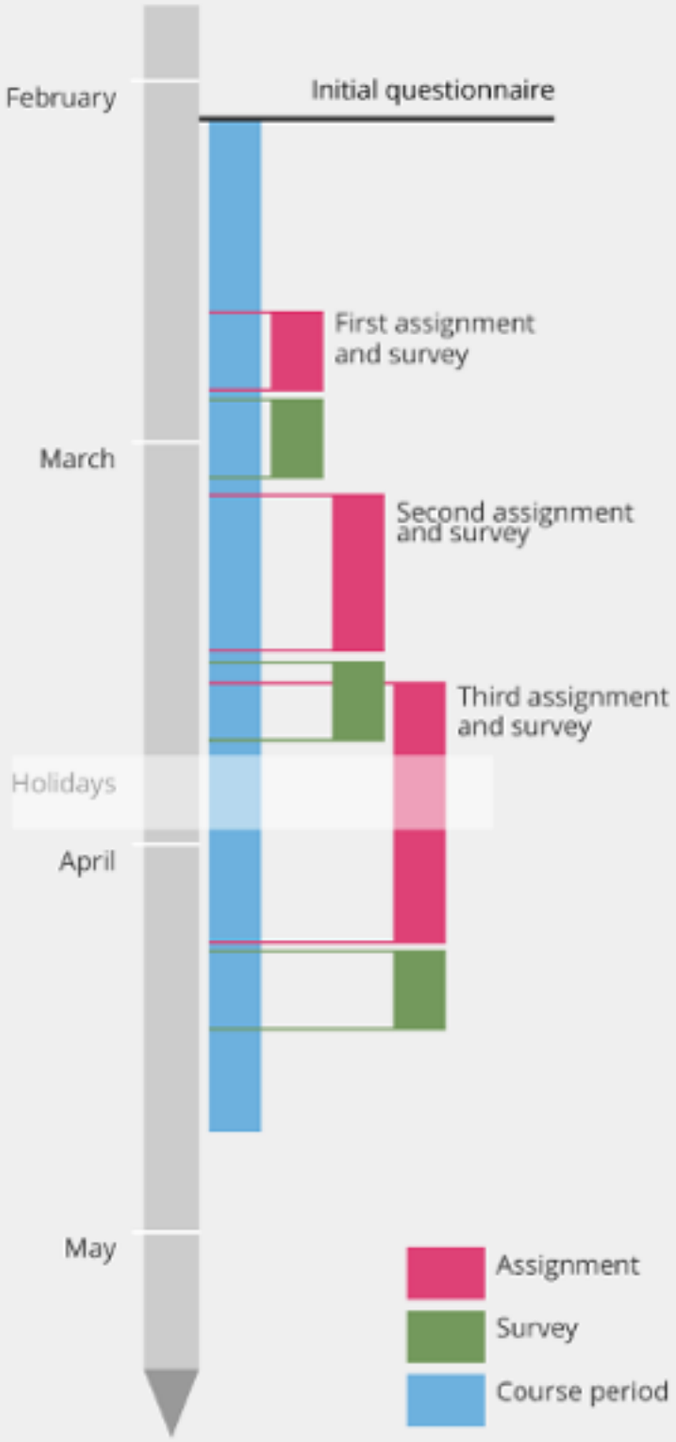
***Strongest expressive** (in blue) and **instrumental** (in green) ties.*
Color saturation, where darker is higher, is the performance of the team

Further a team's **strongest ties explain its performance better than the capabilities of its members**. We tested the technical abilities of participants, asked how much they know about the topic, and assessed their personality traits. **None of these helped to explain the performance** once we accounted for the participant's strongest ties.
When solving problems in a competitive environment, it doesn't matter what or how many people you know; **the only thing that matters is your strongest ties**.



Methodology of the experiment

We measured expressive ties, personality and



Methodology of the experiment

We measured expressive ties, personality, and technical competencies through a questionnaire at the beginning of the experiment. We assigned participants to teams based on their expressive ties. Participants were assigned to three different teams over the course of the experiment. We used the logs of the university wifi system to infer the time participants were spending together. The effect is strongly non-linear: only the strongest ties in both expressive and instrumental networks have an effect on performance. Networks of both instrumental and expressive strong ties explain more of the variance than any other considered factors, such as measured or self-evaluated technical competencies, or the personalities of the team members; and the inclusion of the network of strong ties renders these factors non-significant in the statistical analysis.

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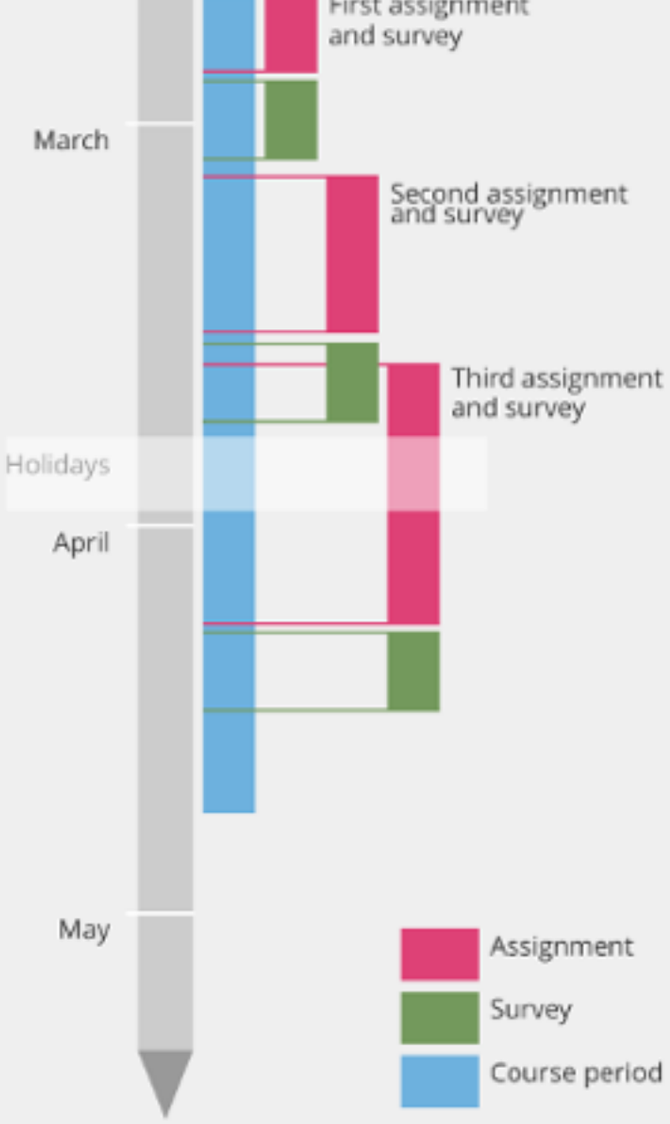

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The Strength of the Strongest Ties in Collaborative Problem Solving
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