

measuring networked media

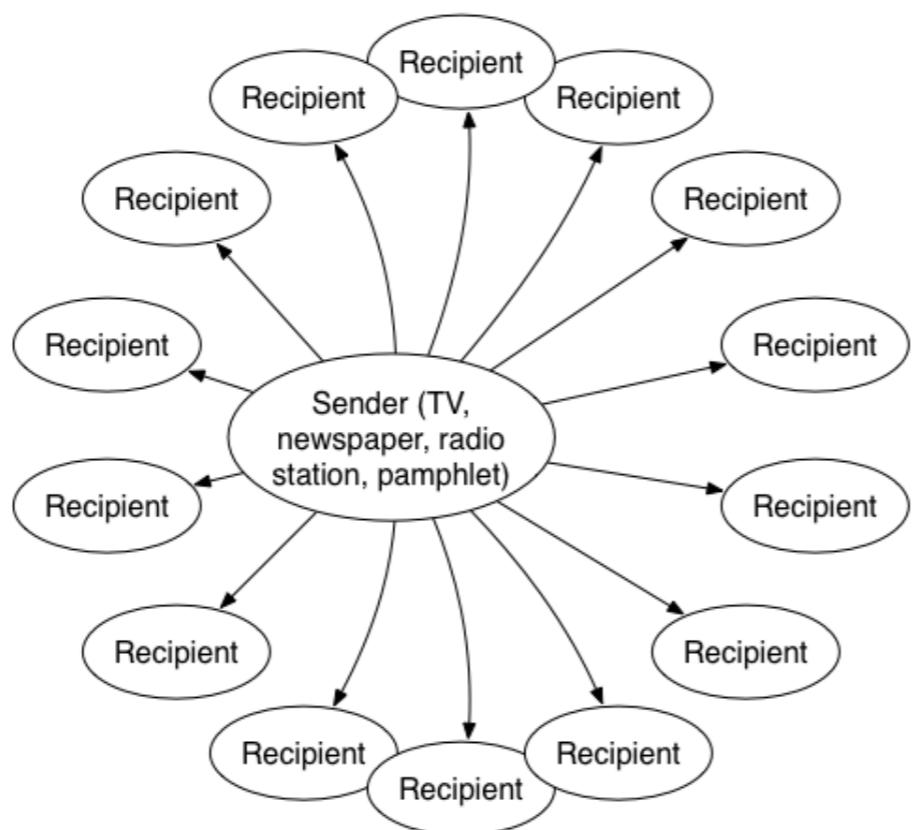
exploring network science methods for online media studies

Presentation at Oxford Internet
Institute Summer Doctoral Programme
11. July 2016

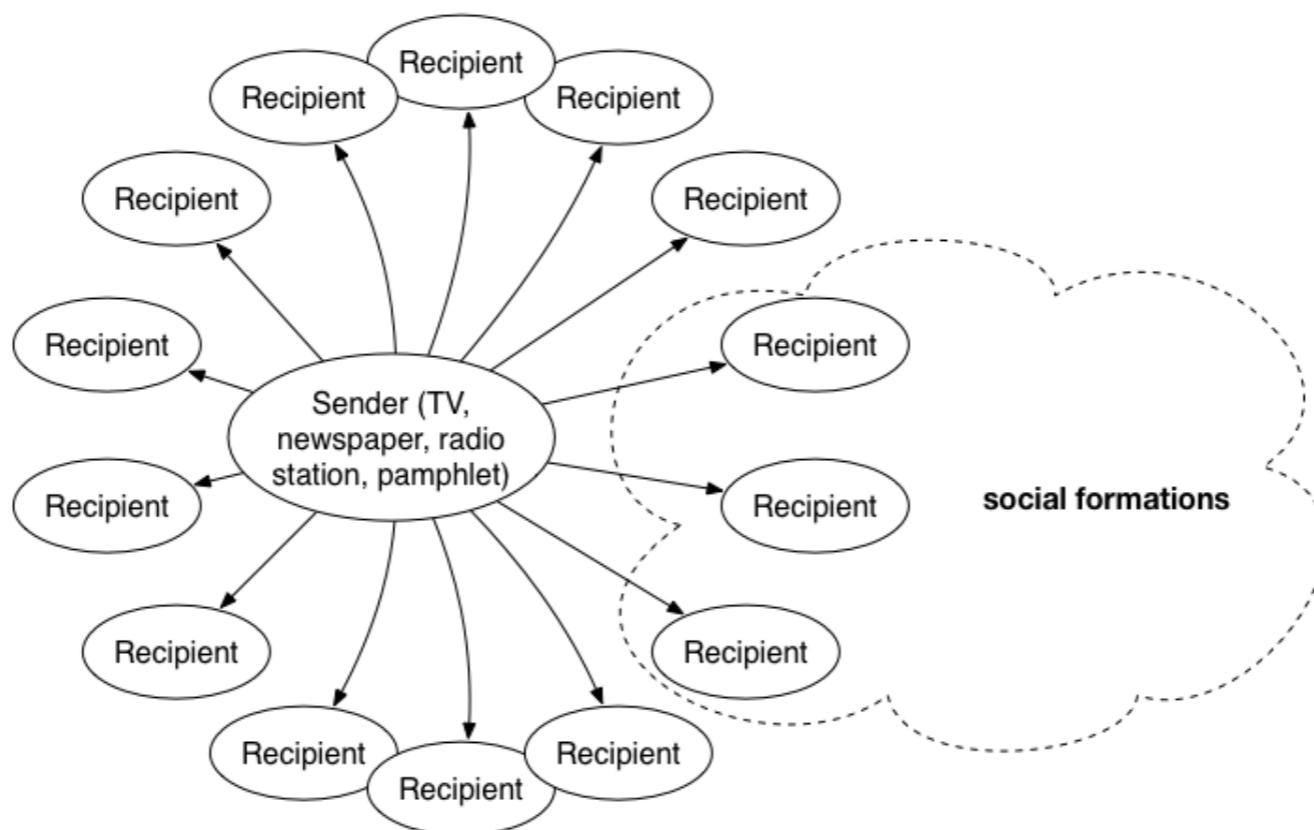
Felix Victor Münch
Digital Media Research Centre
Creative Industries Faculty
Queensland University of Technology

Why?

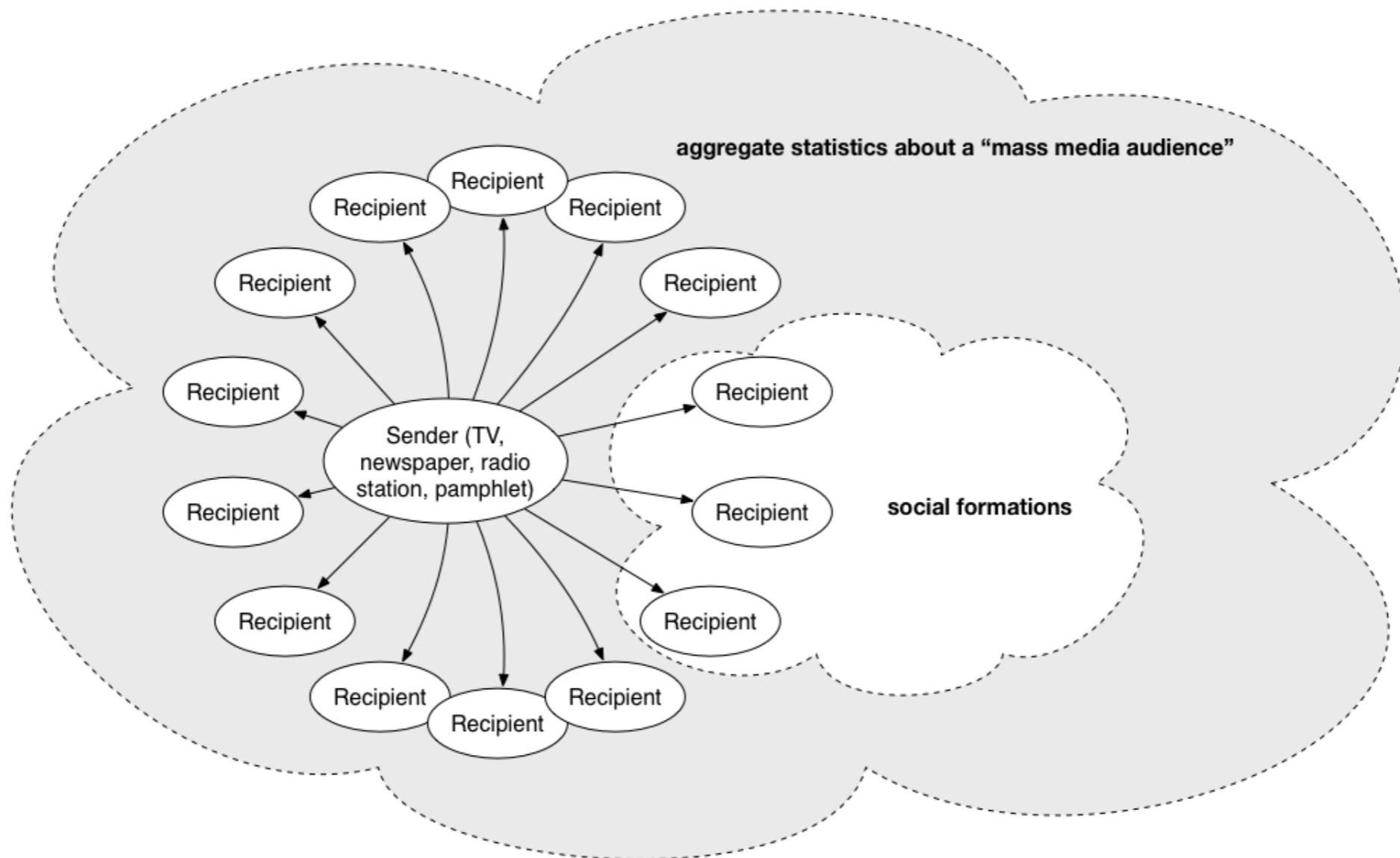
in the past: aggregate statistics about star-shaped networks



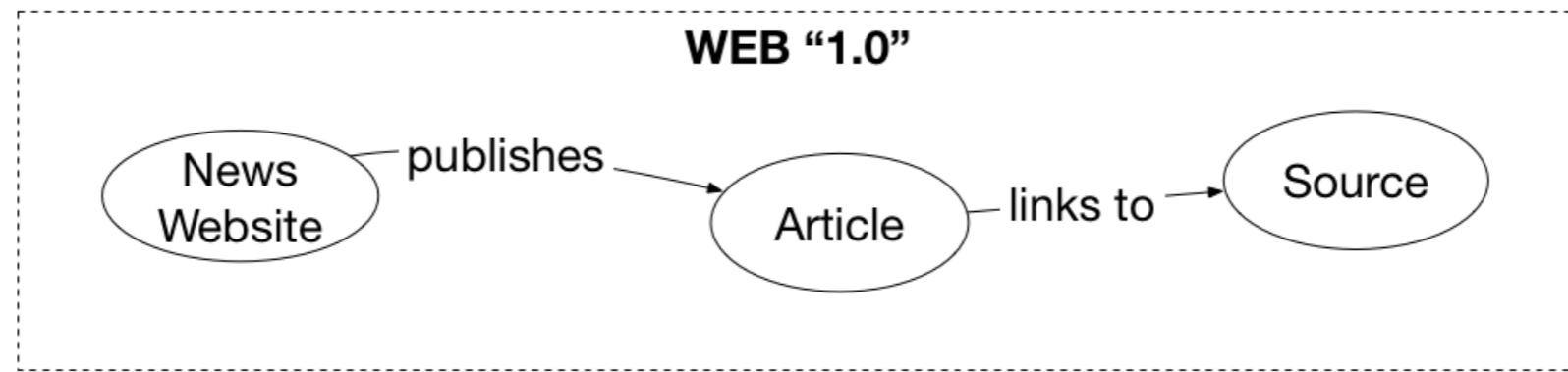
in the past: aggregate statistics about star-shaped networks



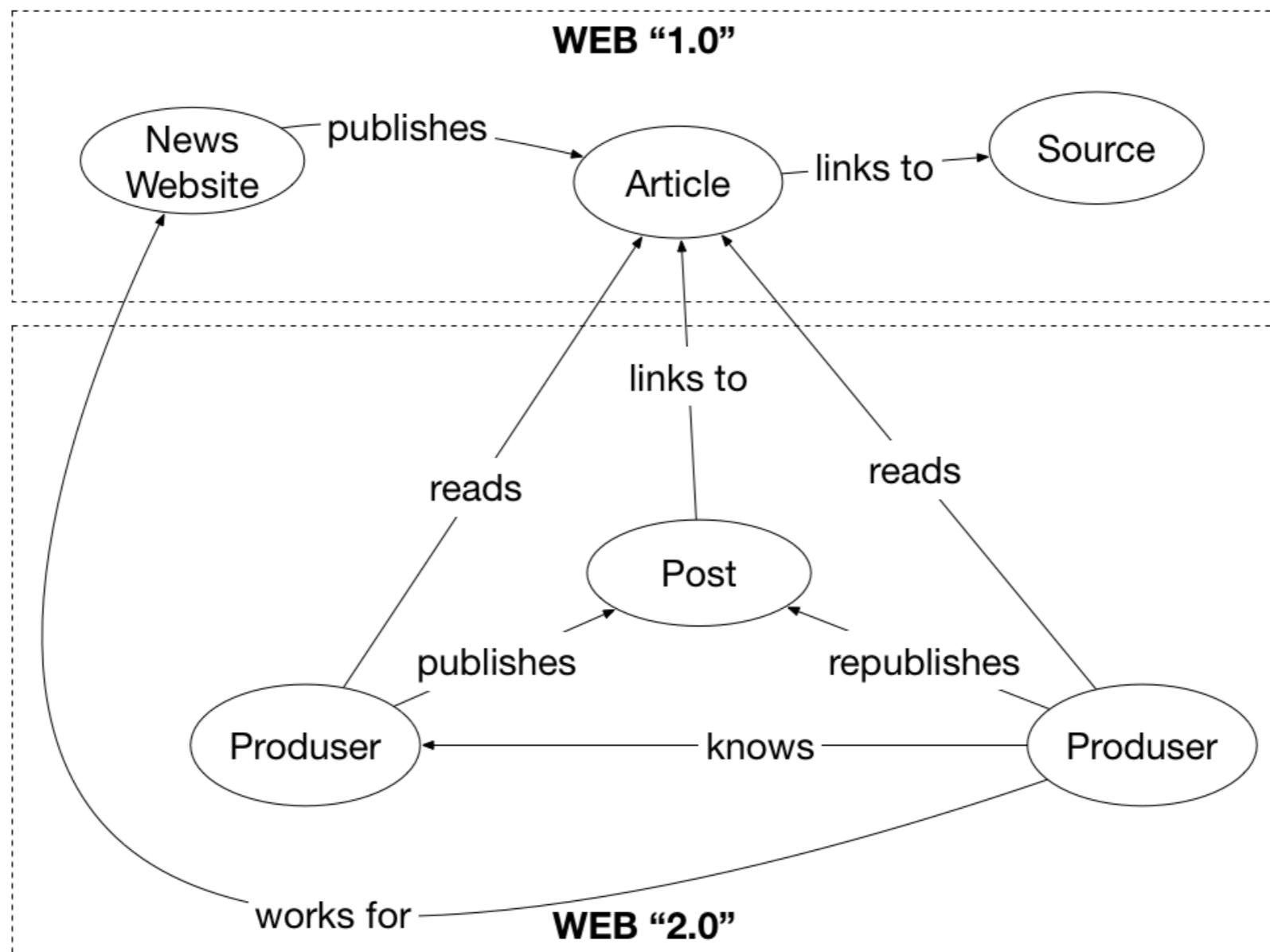
in the past: aggregate statistics about star-shaped networks



90s till now: the networked periphery gets visible and moves to the center



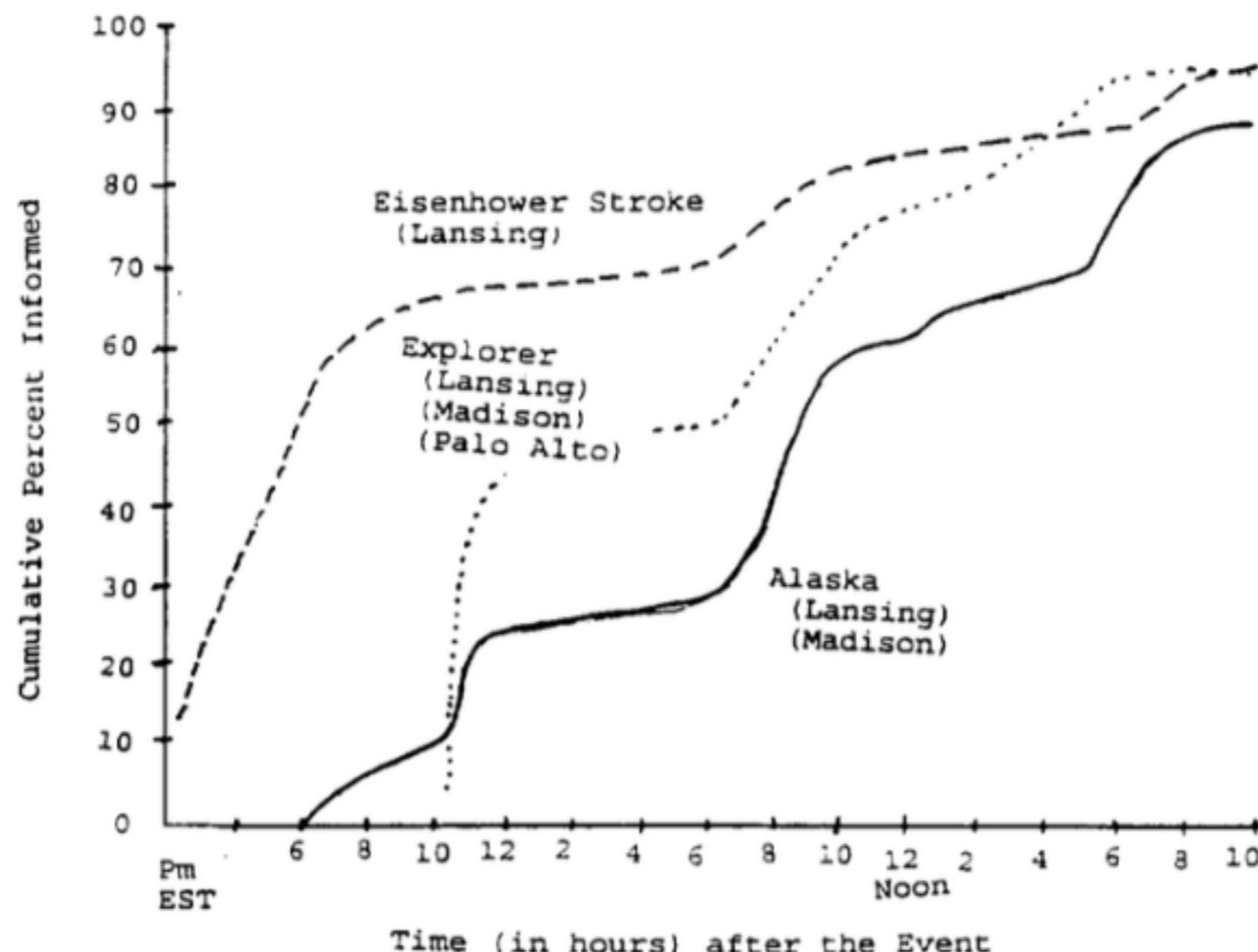
90s till now: the networked periphery gets visible and moves to the center



"established theories in media and communication studies are actually often theories about network structures and dynamics"

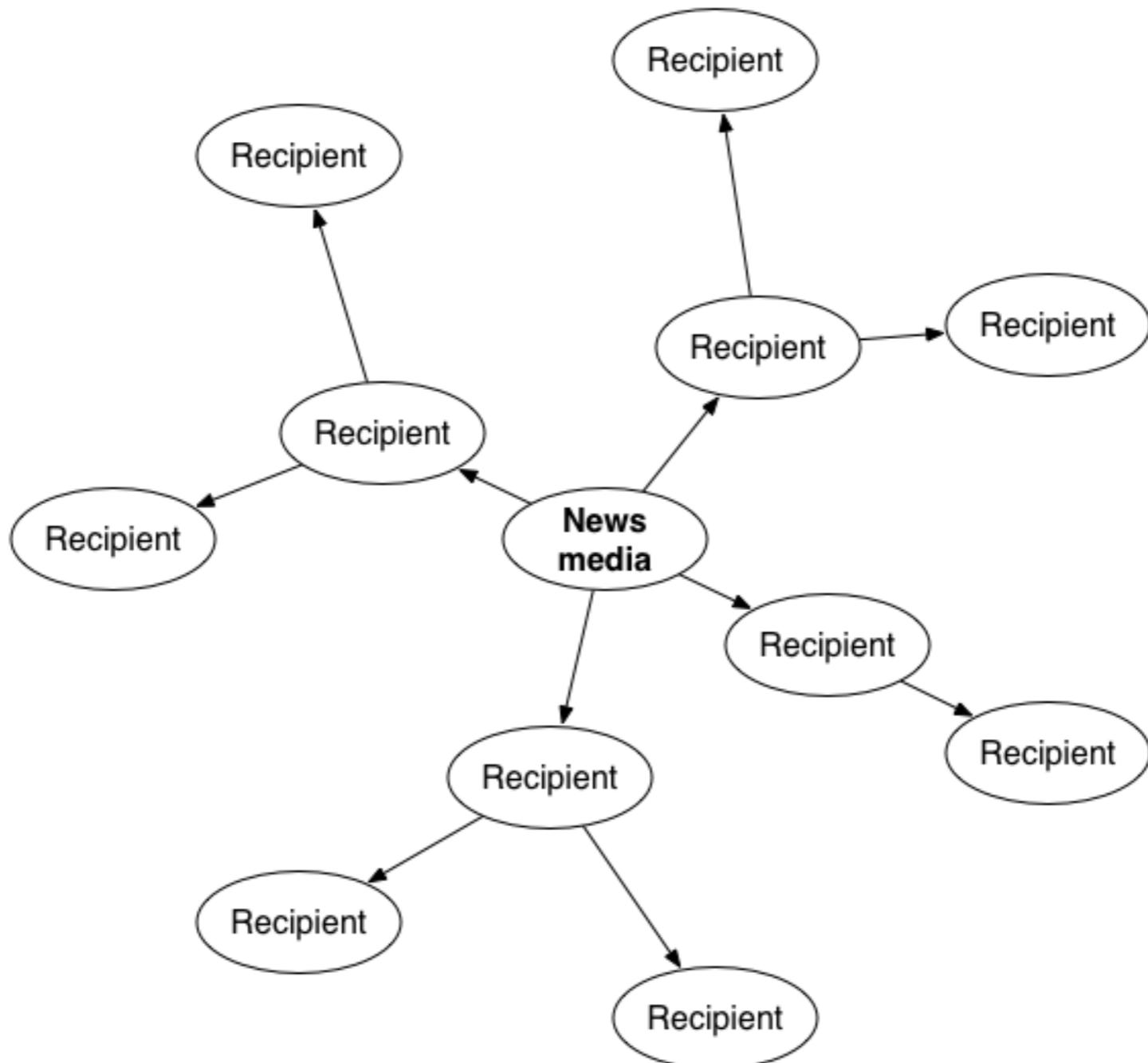
(me, now)

diffusion of news

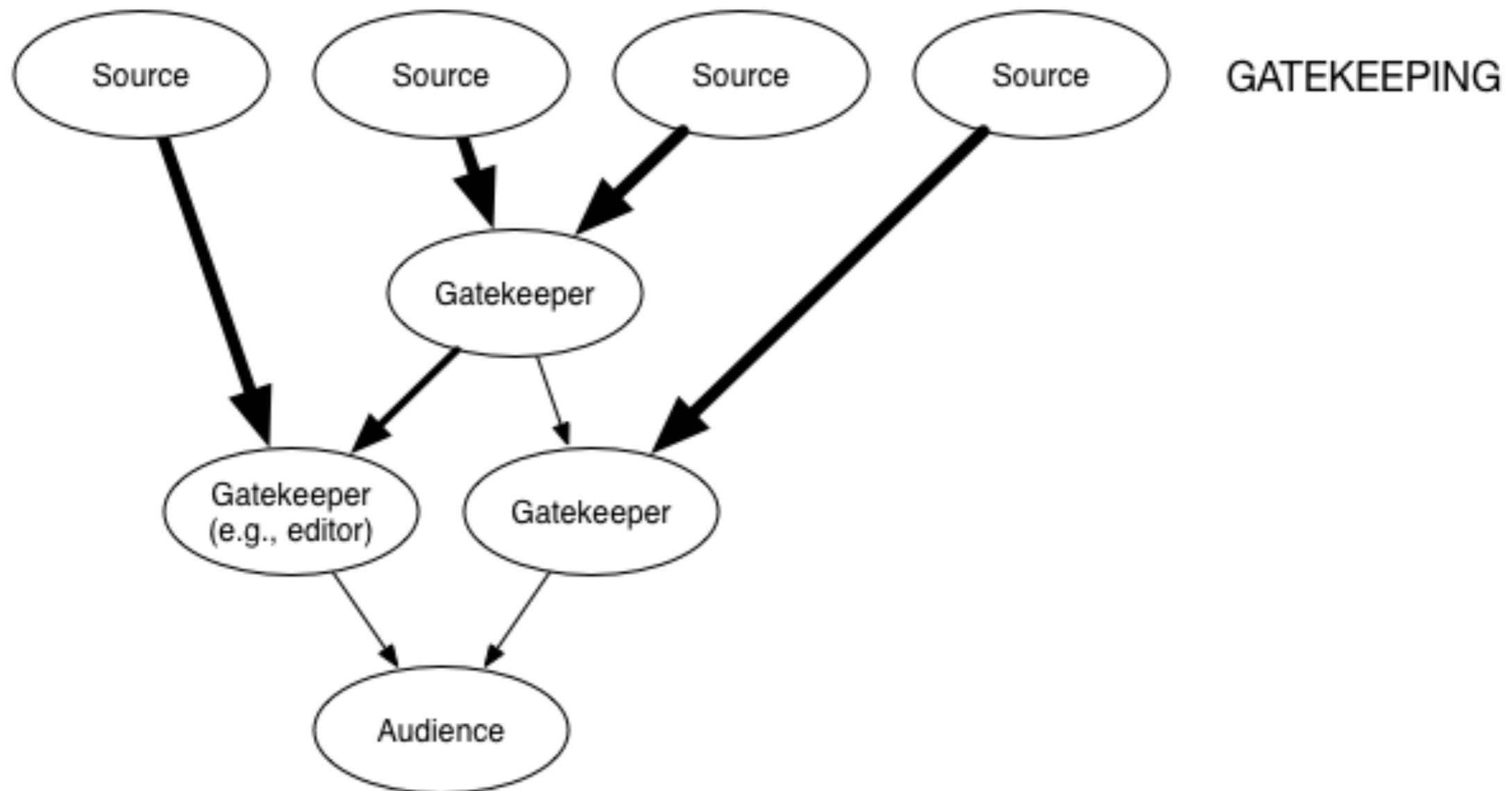


(image source: E.M. Rogers, 2000, p. 564)

diffusion of news

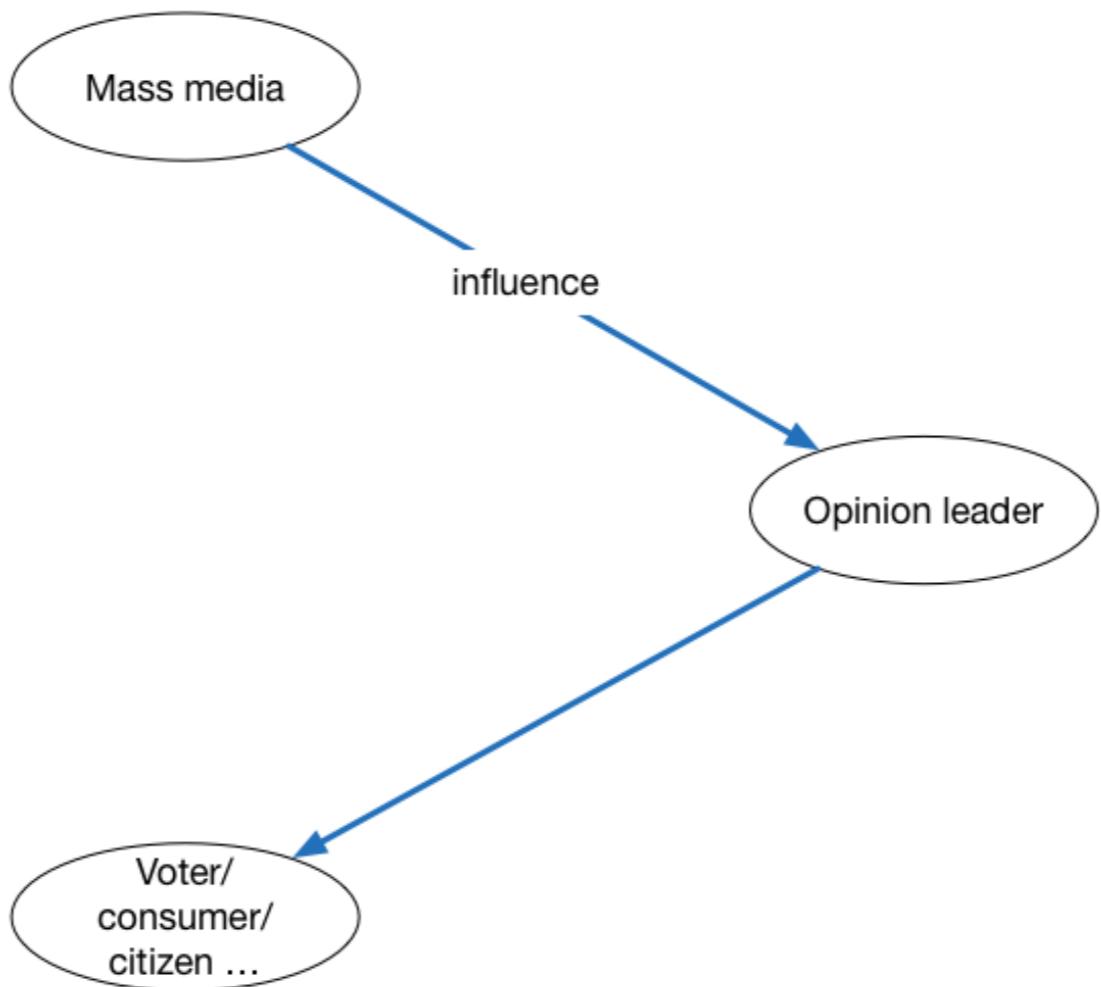


gatekeeping



(see e.g. DeIuliis, 2015)

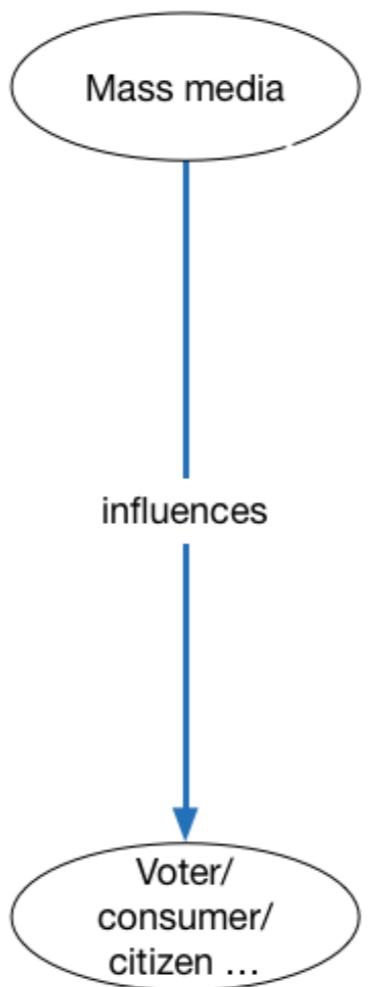
two-step-flow



TWO-STEP-FLOW

(see Davis, 2009)

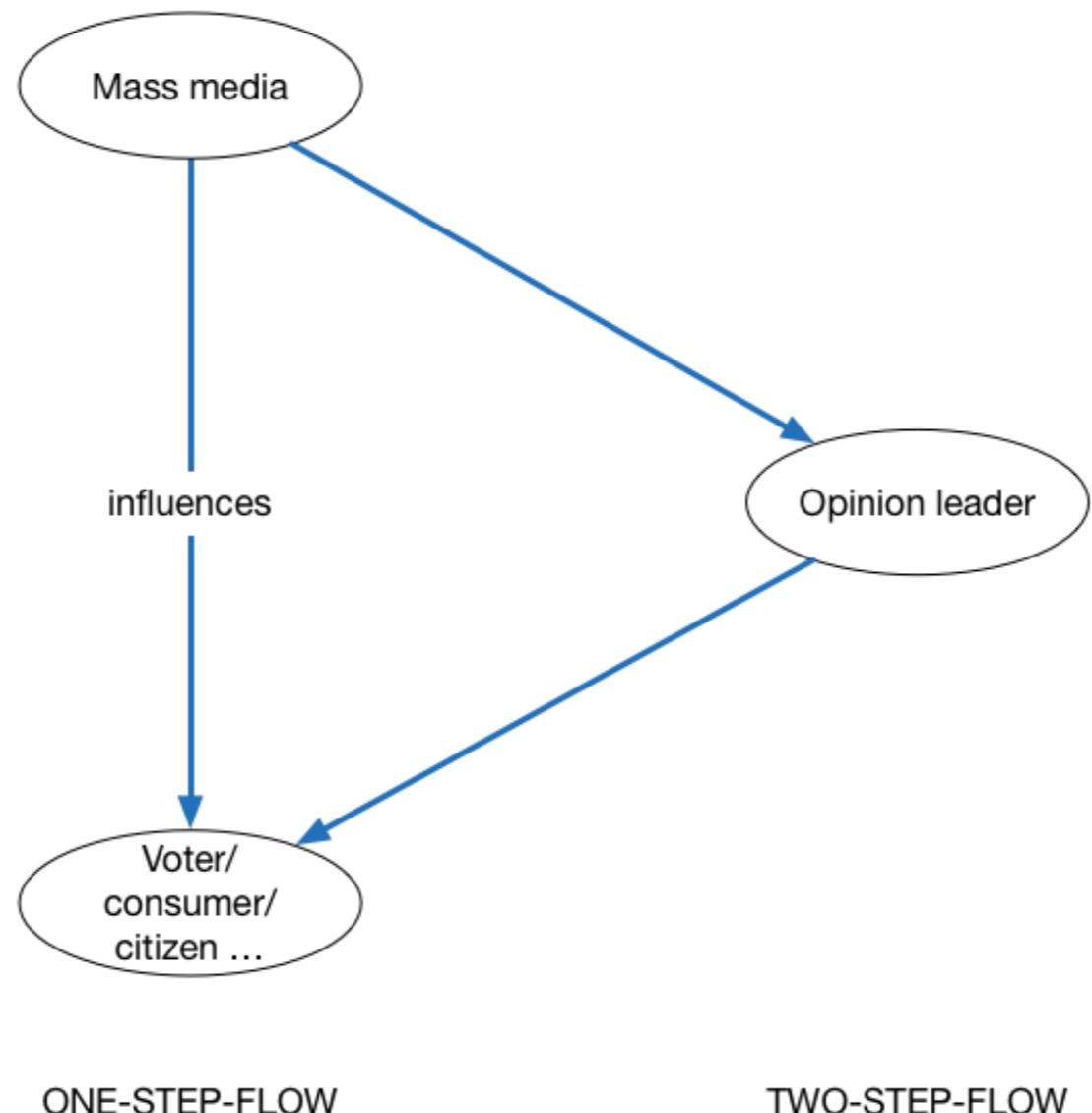
two-step-flow



ONE-STEP-FLOW

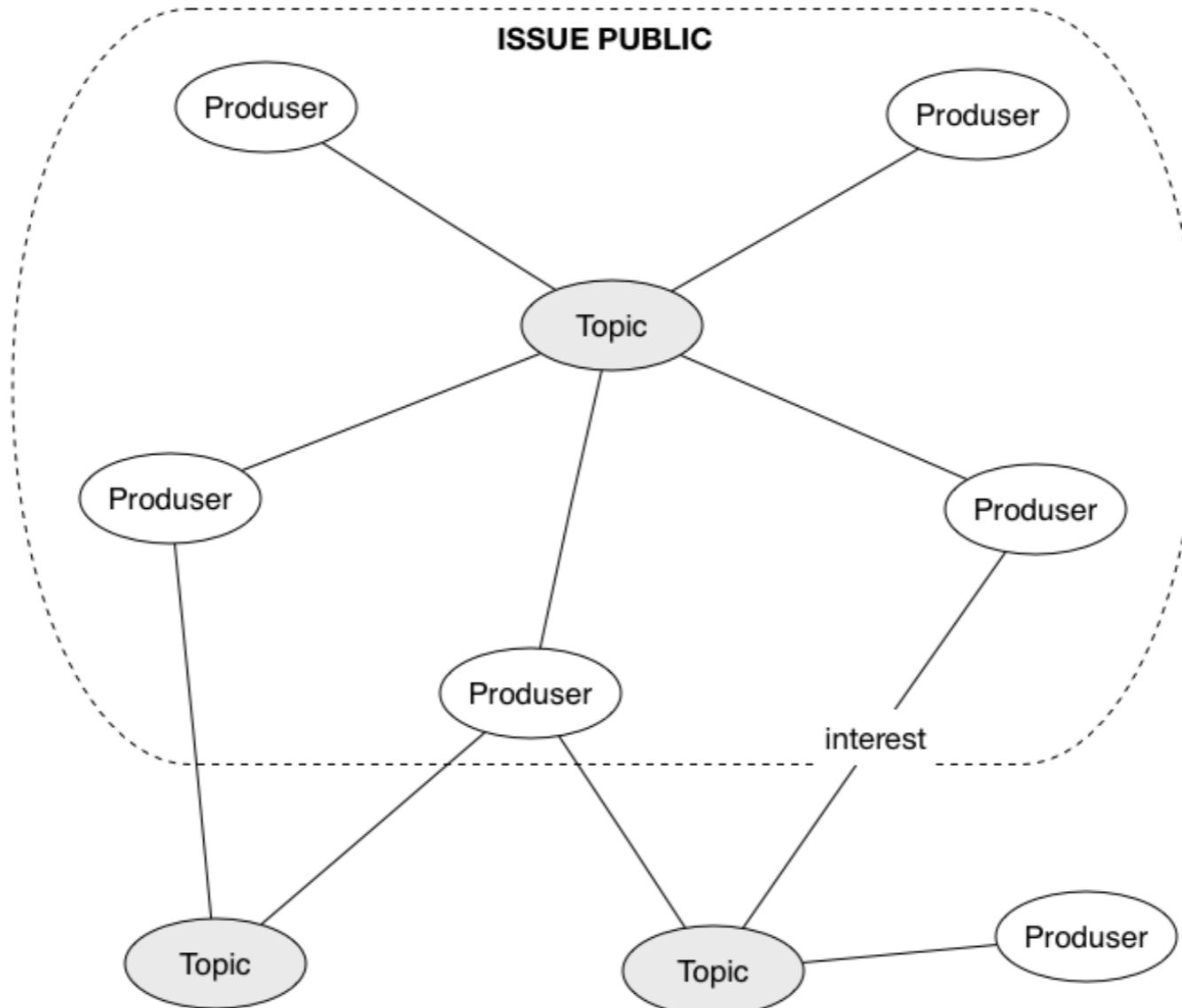
(see Davis, 2009)

two-step-flow



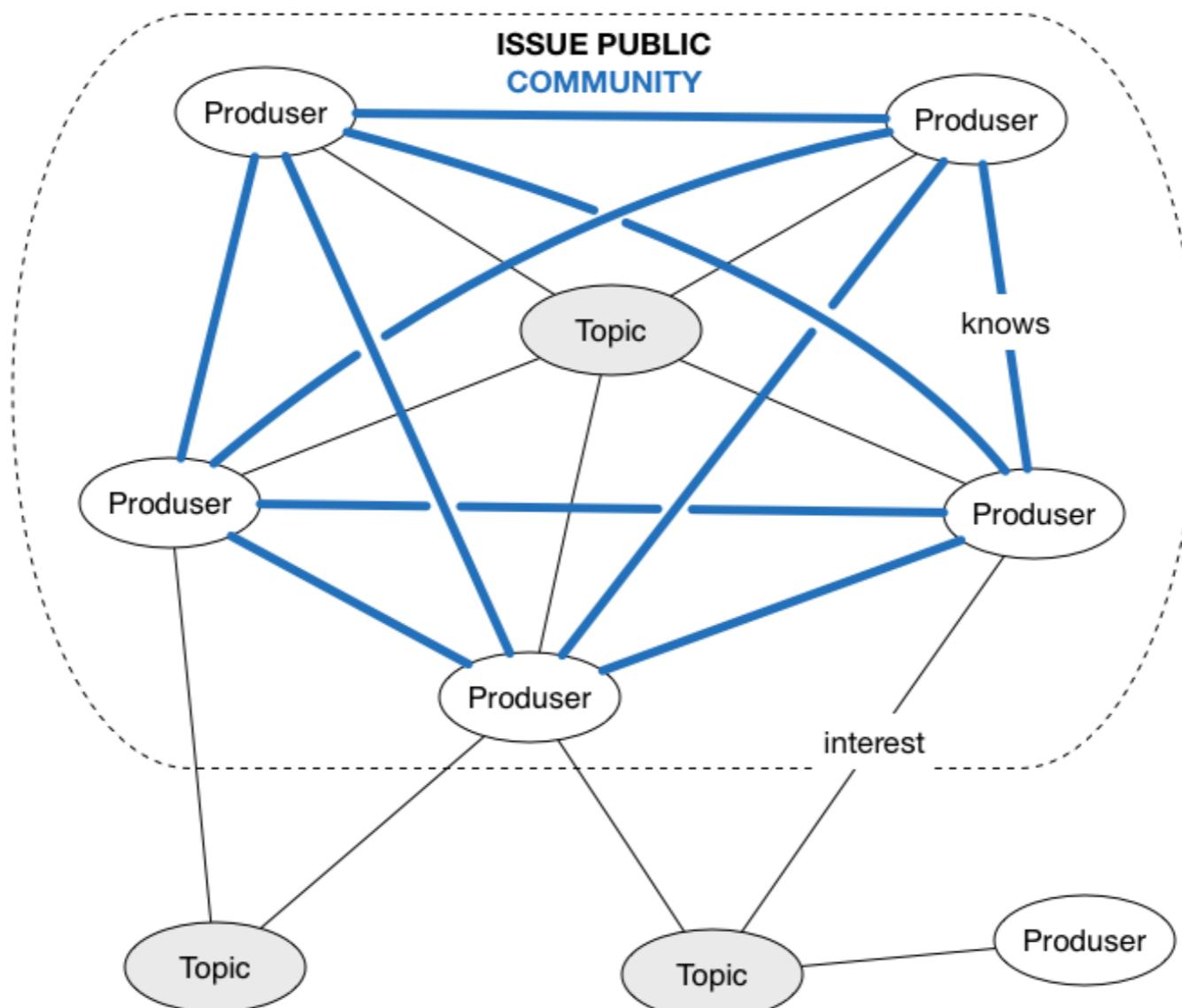
(see Davis, 2009)

issue publics & "virtual" communities



(see Bruns & Burgess, 2011)

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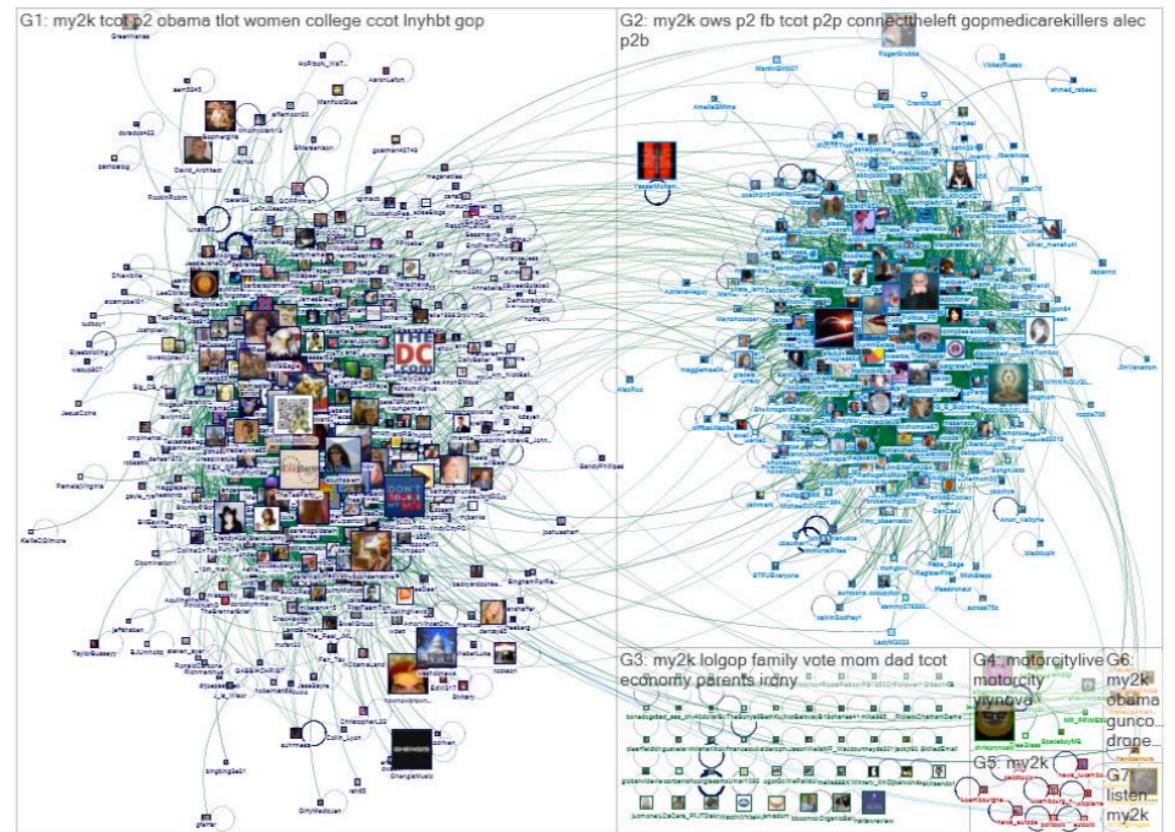
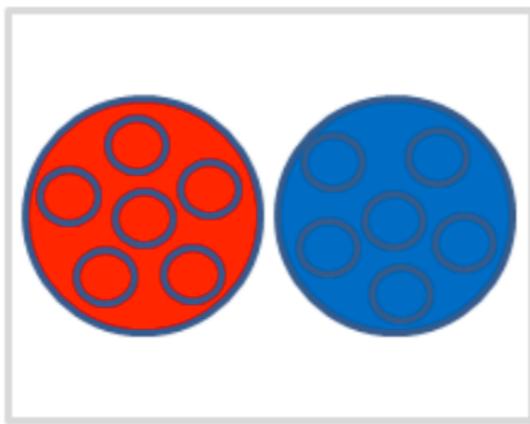
Networks everywhere! ? !

How to untangle them?

possibilities of applying network methods on media and communication

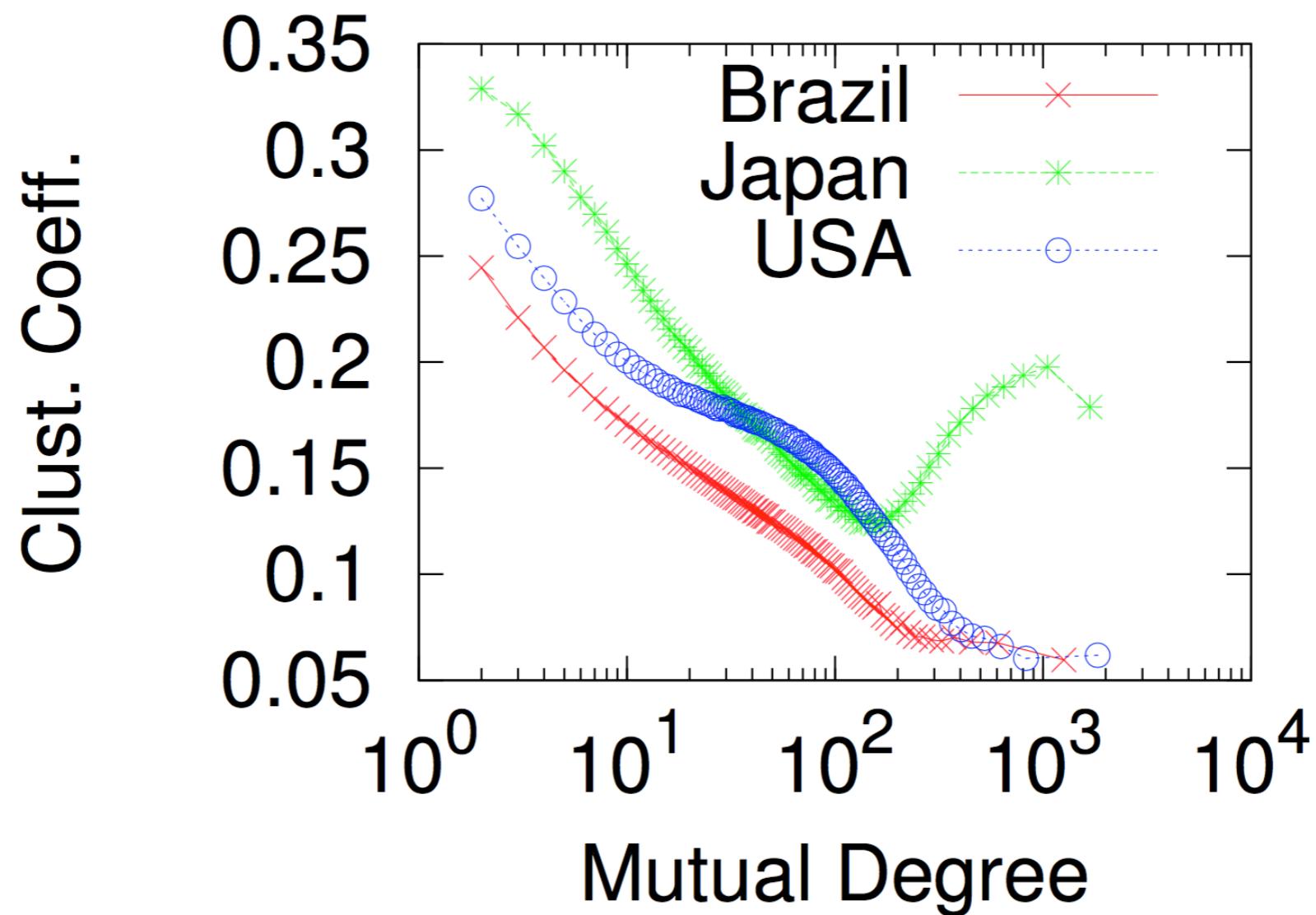
- 1. visualisation**
- 2. network measures**
- 3. models**

1. visualisation



(Smith et al., 2014) (source: <http://www.pewinternet.org/2014/02/20/mapping-twitter-topic-networks-from-polarized-crowds-to-community-clusters/>)

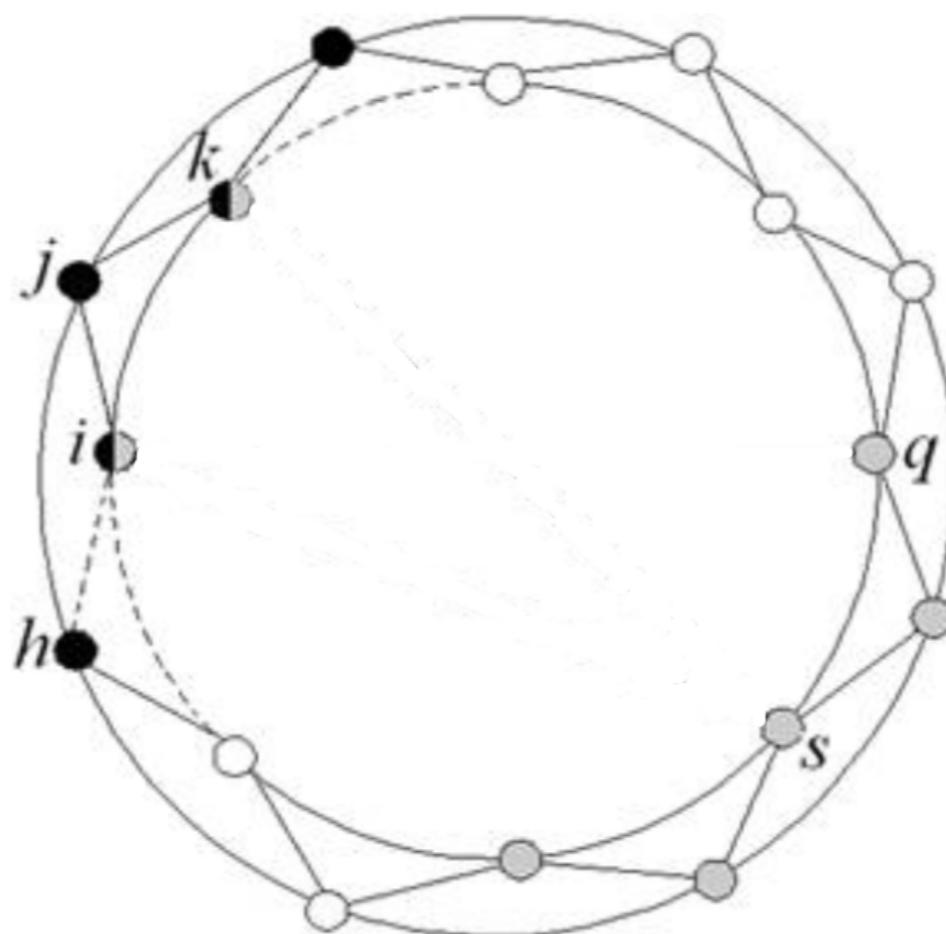
2. network measures



(Myers et al., 2014)

3. models

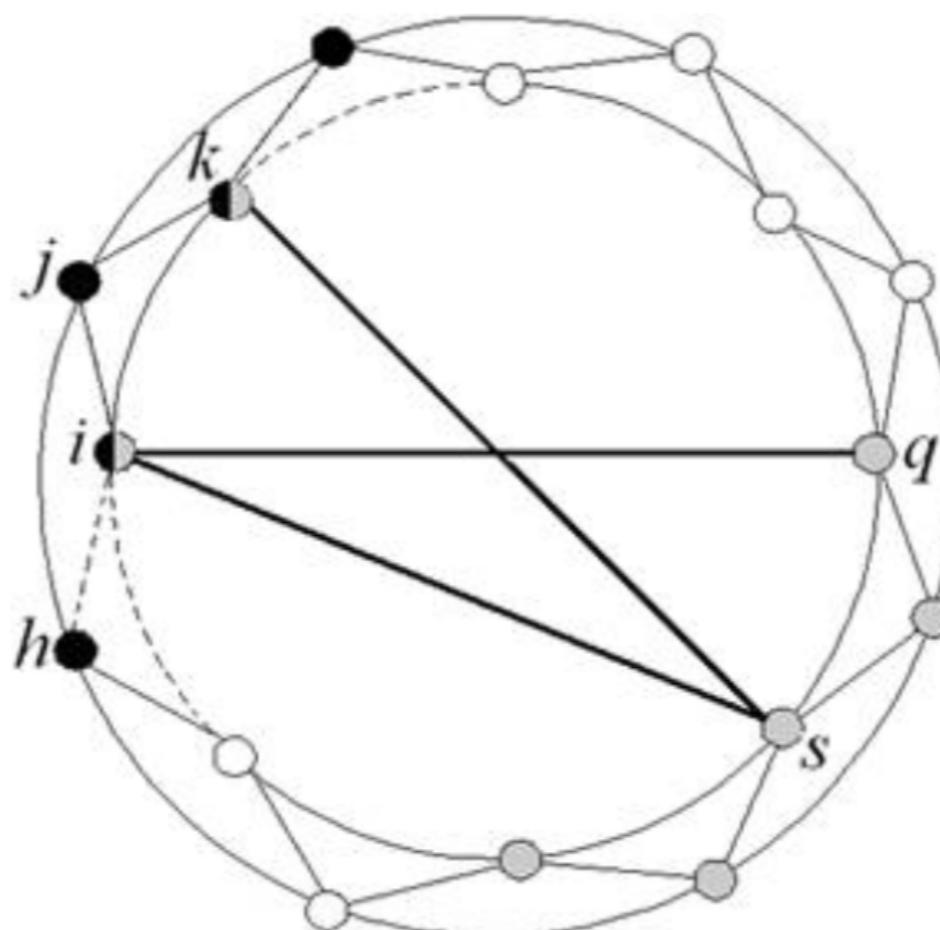
e.g. small world network as a ring



(image source: Centola et al., 2007)

3. models

e.g. small world network as a ring



(image source: Centola et al., 2007)

dukt

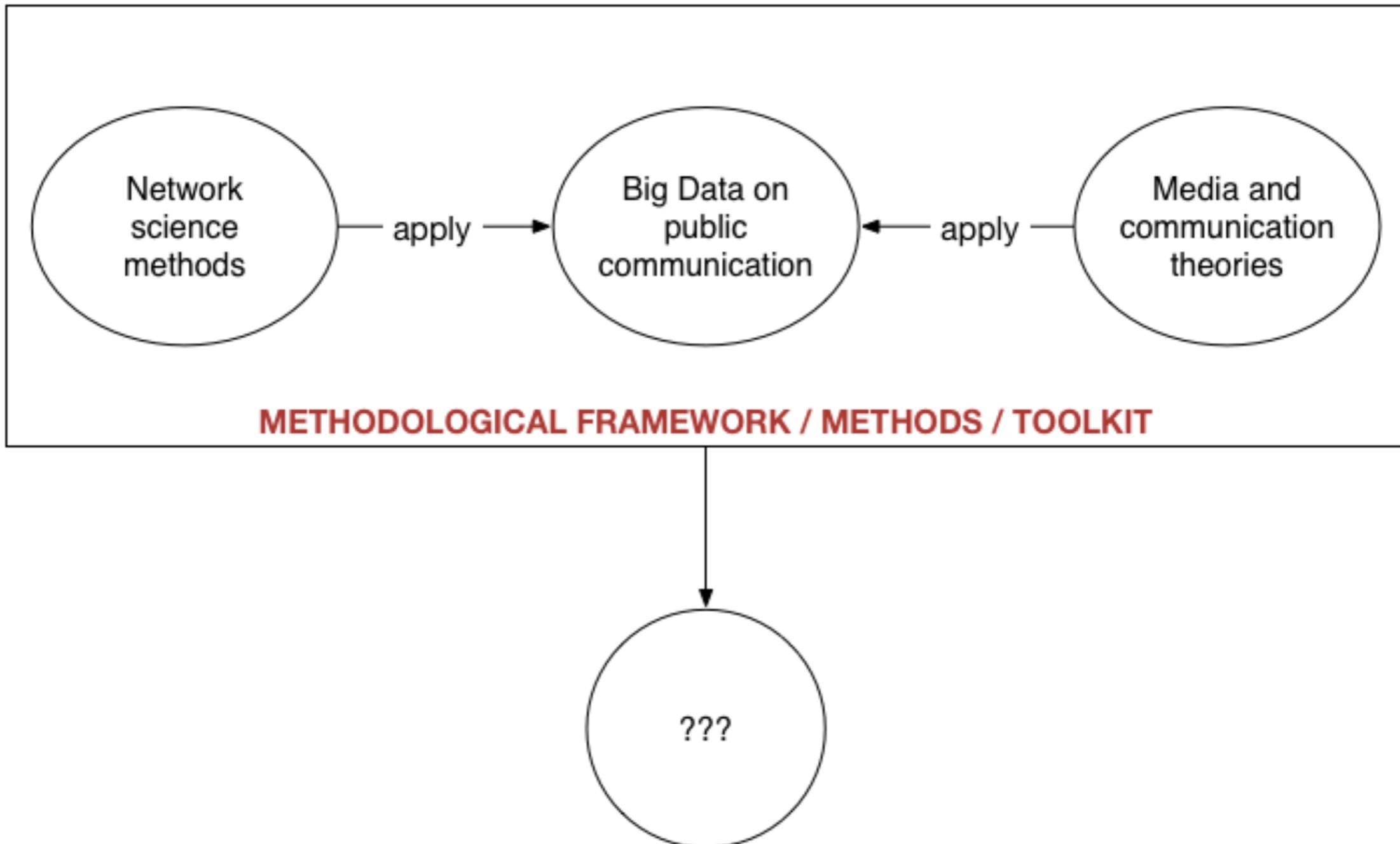
It's still a kind of magic



"The media-studies perspective on the web is often characterised by an absence of formal network techniques."

Ackland, R. (2013). Web social science: Concepts, data and tools for social scientists in the digital age. SAGE.

PhD project objectives

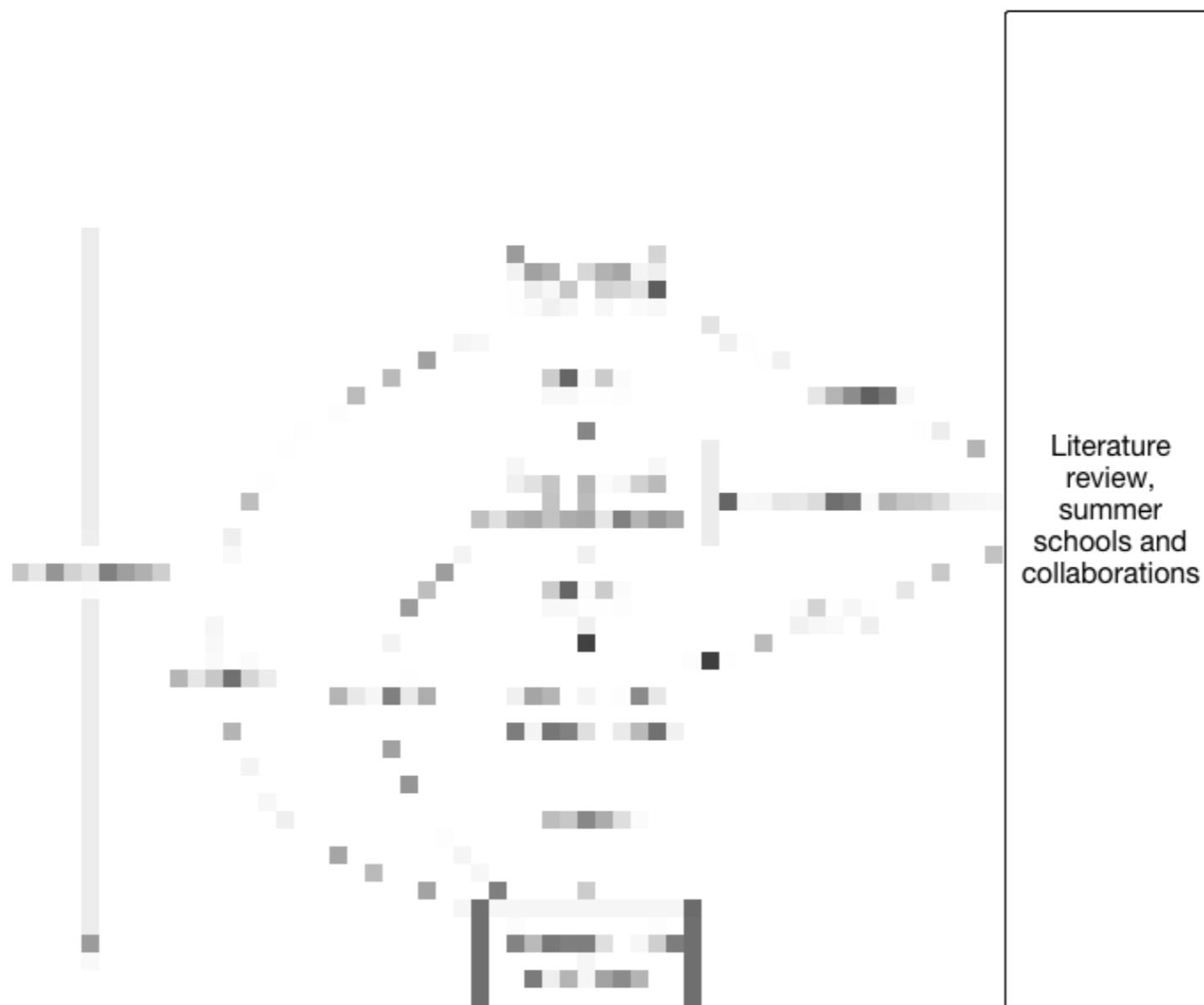


Research Questions

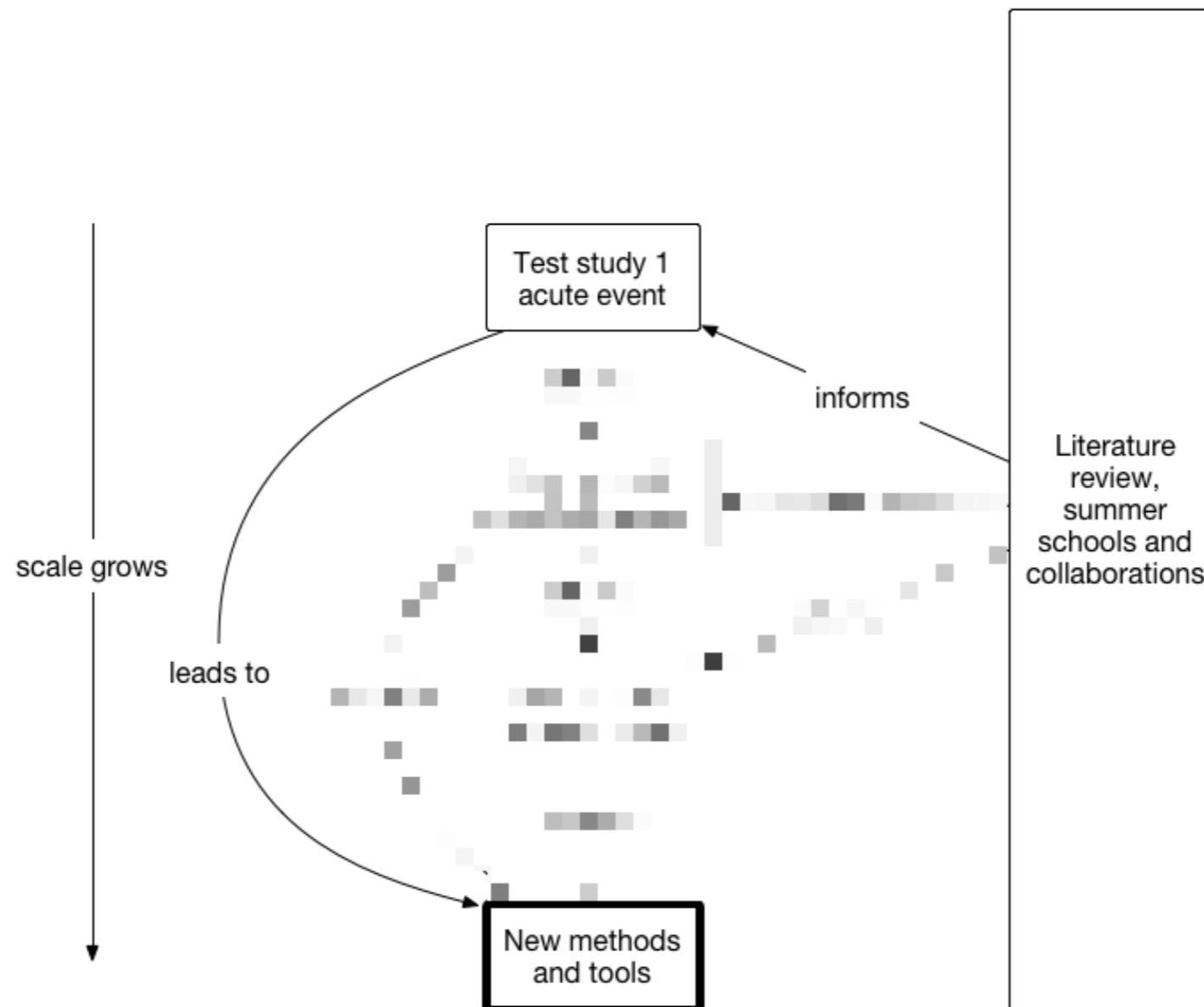
1. How can we interpret established theories about public communication from the social sciences and media and communication studies as theories about the structural dynamics of networks?
2. How can we apply network science and modelling methods to analyse the structural dynamics of networks in online public communication?
3. Can this analysis confirm established theories or lead to new theories about online public communication and the public sphere?

Research Design

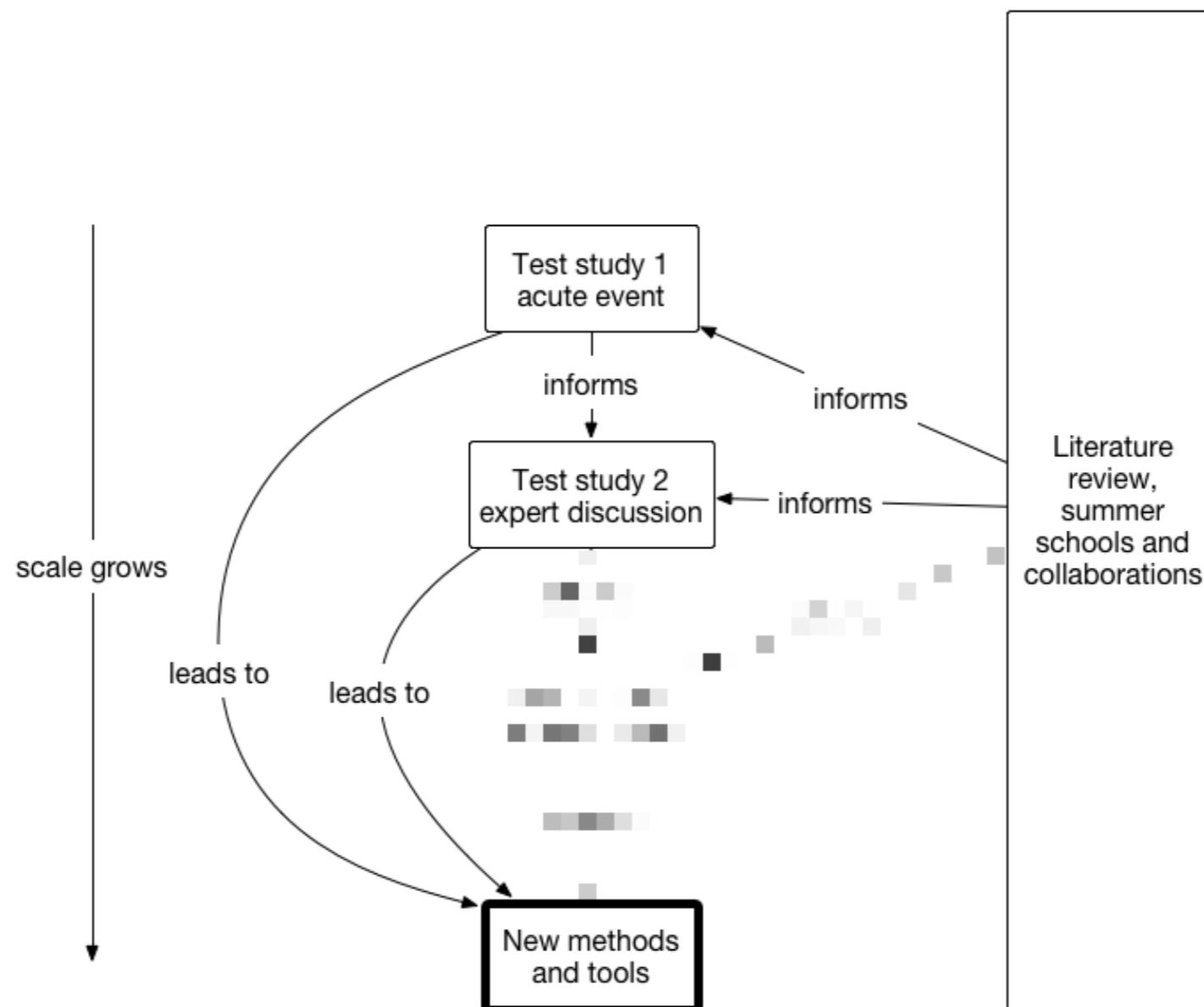
exploratory sequential mixed methods in a multi-phase mixed methods design



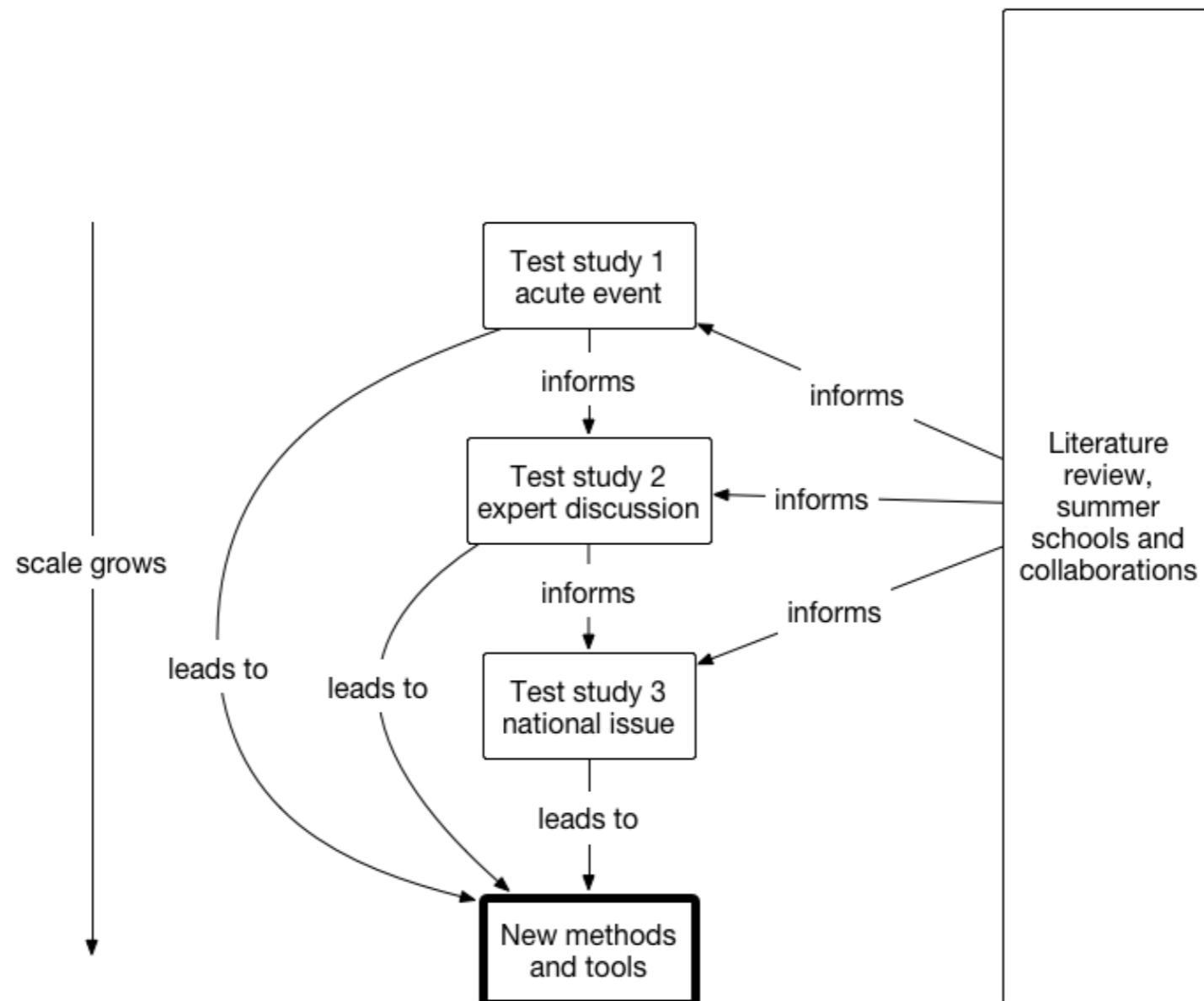
exploratory sequential mixed methods in a multi-phase mixed methods design



exploratory sequential mixed methods in a multi-phase mixed methods design



exploratory sequential mixed methods in a multi-phase mixed methods design



First test study

objective

- explore tools to transform and process Twitter and website data to look at the spread of hashtags from a network perspective
- explore notions and theories about virality/contagion/diffusion

#SydneySiege: the first tweet



CWN
@Cyber_War_News

roads, buses, footpaths all shut down...
martin place in seige #SydneySiege

RETWEETS 2

9:05 AM - 15 Dec 2014

Reply to @Cyber_War_News

Within one hour: 1800
tweets tagged
#SydneySiege

Within 24 hours: >
630,000 tweets tagged
#SydneySiege

source (including other slides in this design): presentation with Peta Mitchell at Hans-Bredow-Institute (Hamburg) in June 2015

#SydneySiege: Islamophobia



Phillip

@mrphlip



Follow

Disappointed (but sadly not surprised) by how many #sydneysiege tweets are advocating snap capital punishment, or blanket islamophobia...



RETWEETS

2

FAVORITE

1



10:35 AM - 15 Dec 2014

#illridewithyou: the birth of a 'viral' hashtag

Sir Tessa (@sirtessa) posted a tweet:

If you reg take the #373 bus b/w Coogee/MartinPl, wear religious attire, & don't feel safe alone: I'll ride with you. @ me for schedule.

RETWEETS 674 FAVORITES 994

3:28 PM - 15 Dec 2014

Sir Tessa (@sirtessa) posted a tweet:

Maybe start a hashtag? What's in #illridewithyou?

RETWEETS 1,817 FAVORITES 1,179

3:29 PM - 15 Dec 2014

Within ~3 hours: 13 tweets tagged #illridewithyou
Within 24 hours: > 280,000 tweets tagged #illridewithyou

The #sydneysiege and #illridewithyou

Martin Place siege: #illridewithyou hashtag goes viral

December 16, 2014

 Read later

Brittany Ruppert

#IllRideWithYou Goes Viral As Australians Band Together Against Islamophobia

SARAH KIMMORLEY | DEC 16 2014, 5:25 AM |  |  456 | 

AUSTRALIA

#illridewithyou goes viral after Sydney siege

Anti-Islamaphobia campaign trends globally in solidarity with Muslims after cafe standoff raised fears of reprisal.

15 Dec 2014 13:55 GMT | Australia, Asia Pacific



What means viral?

notions of virality

**shares/retweets/
interactions per
view (virality as
a property of some
spreadable item)**

Amanda Zamora (@amzam) FOLLOW

@Upworthy's virality metrics: shares per view, clicks per share

UPWORTHY

What The Hell Is Virality?

Shares per View	Clicks per Share	Viral?
LOW	LOW	nope
HIGH	LOW	kinda?
LOW	HIGH	not so much
HIGH	HIGH	Hell Yeah!

To get clicks, you MUST focus on framing things perfectly.

FAVORITES 1

8:14 AM - Mar 12, 2013

notions of virality

complex vs. simple contagion (virality as a process)

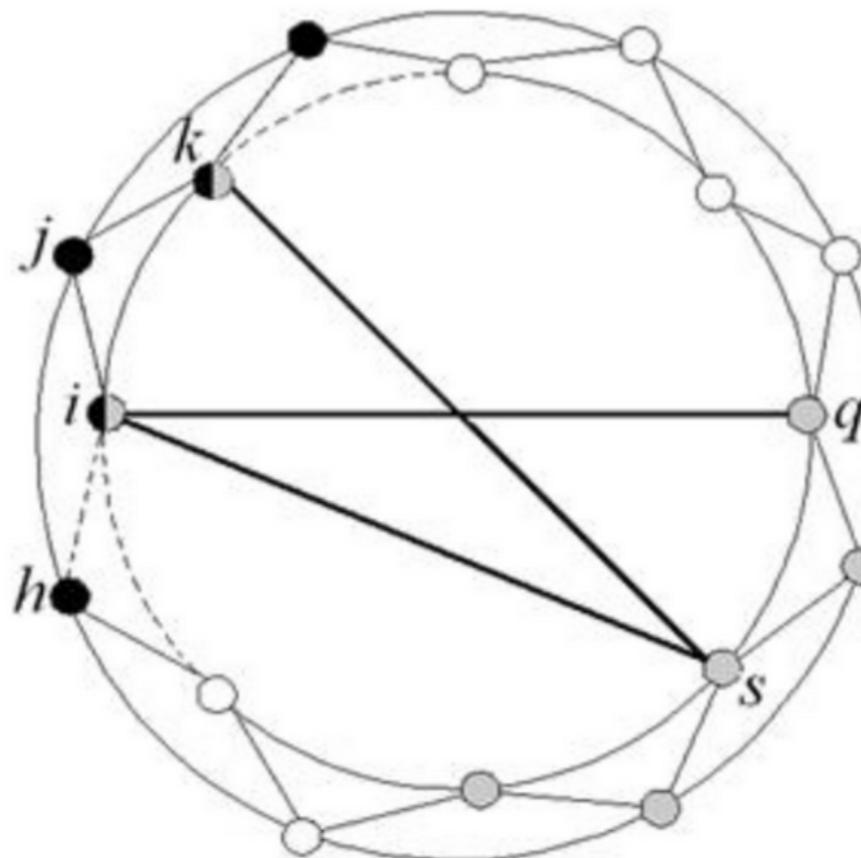
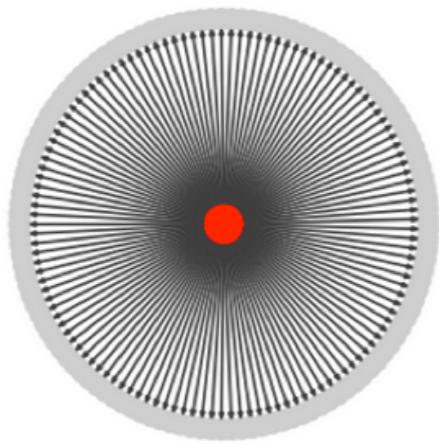


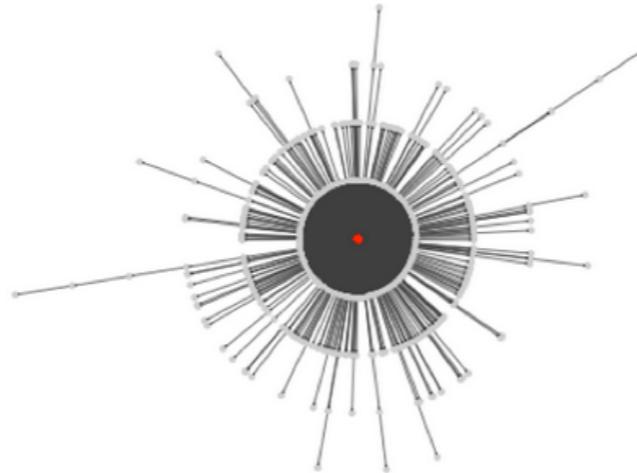
FIG. 2.—A ring lattice with $z=4$ and three ties. The figure shows the width of the bridge between neighborhood J (black and gray/black nodes, with focal node j) and neighborhood S (gray and gray/black nodes, with focal node s), showing the two common members (gray/black nodes). An increment in the threshold from $\tau=1/z$ to $\tau=2/z$ triples the width of the bridge required to create a shortcut (bold lines) between J and S , from one tie to three. The two ties is and ks are sufficient to activate s , and the third tie from i to q is sufficient to activate q , given the tie from s to q .

notions of virality

Average Shortest Path Length aka Wiener Index aka
"Structural Virality"



(a) $d = 1.98$



(b) $d = 2.47$



(c) $d = 14.4$

(Goel et al., 2013; image source: Cheng et al. 2014)

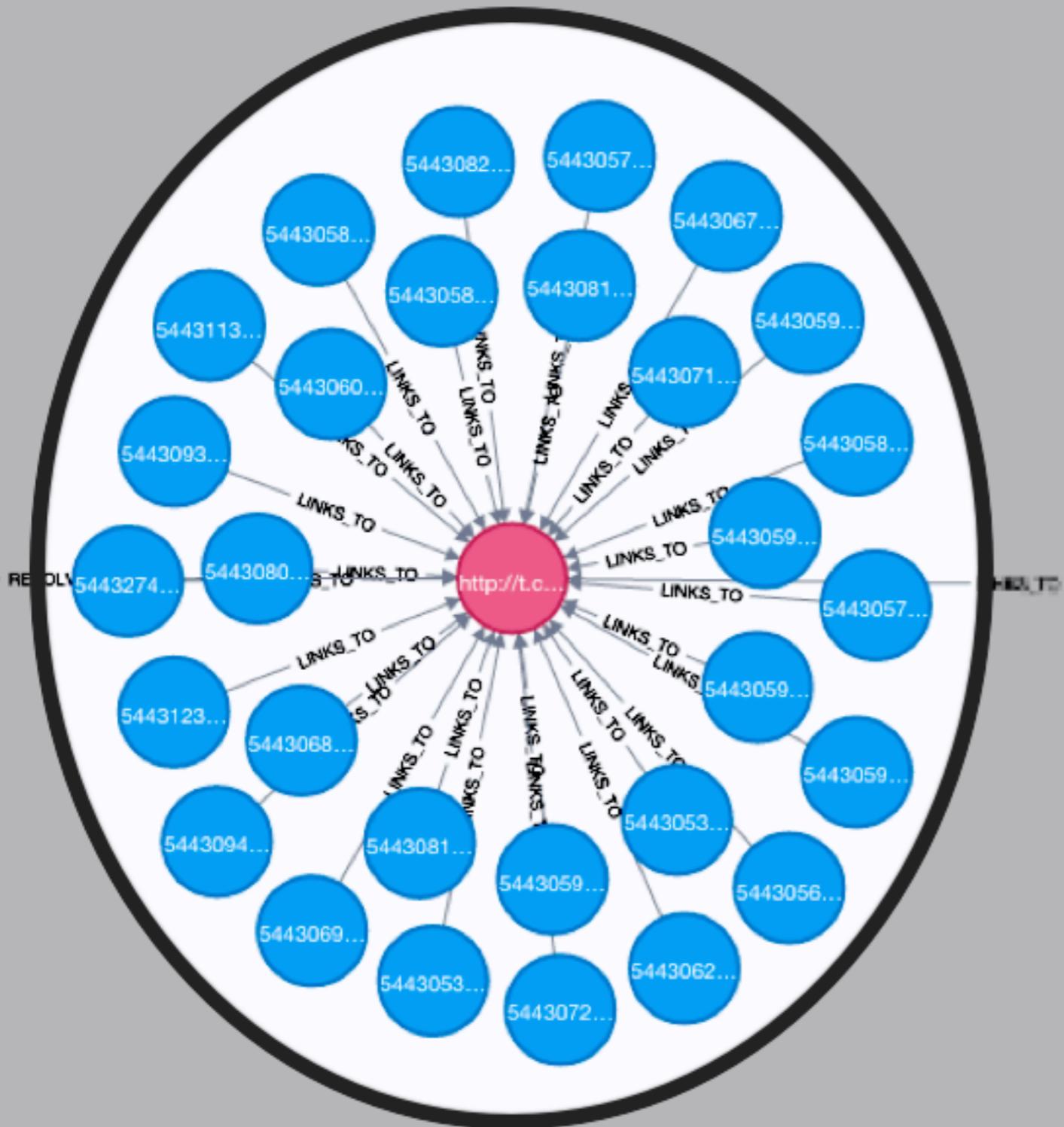
methods

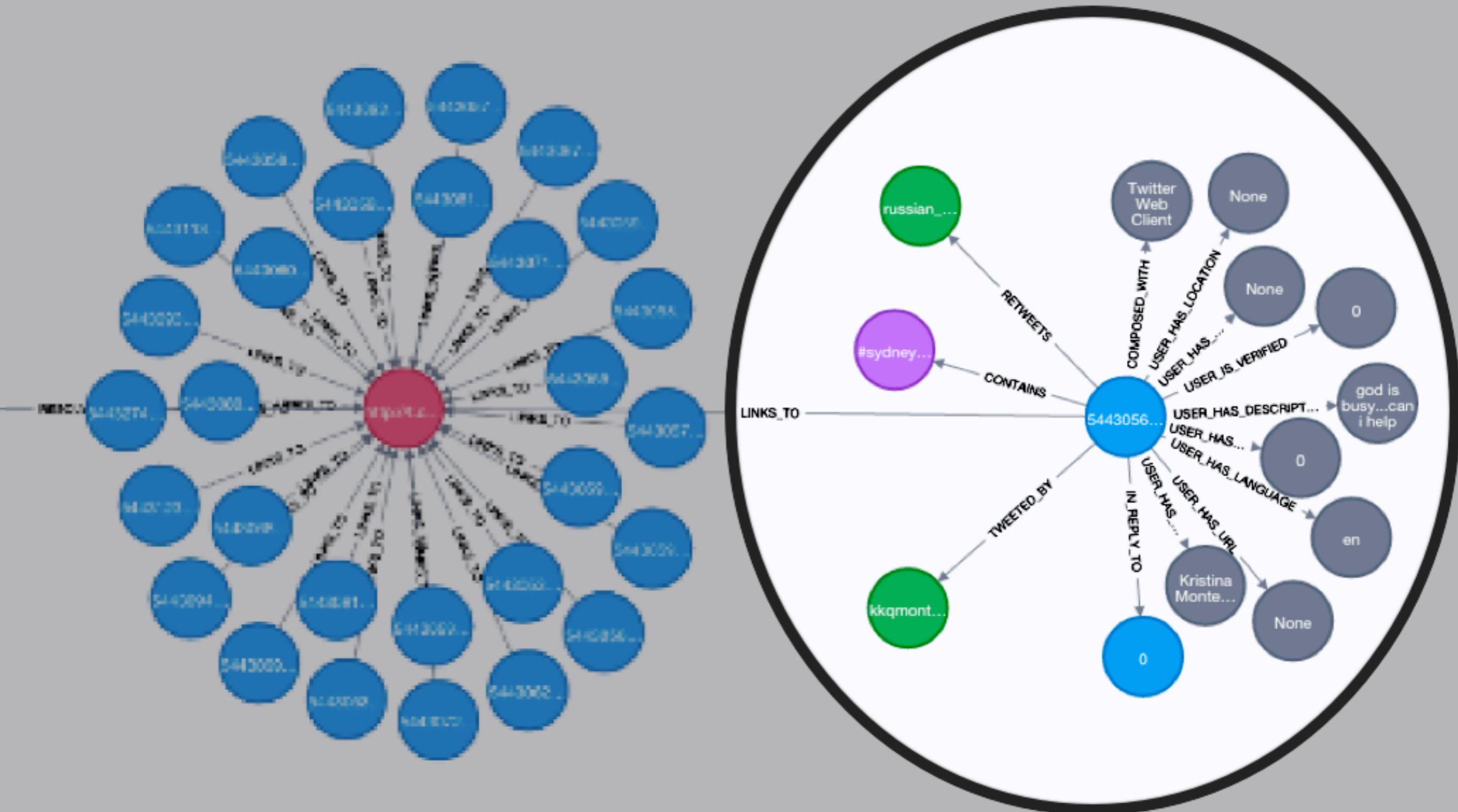
done:

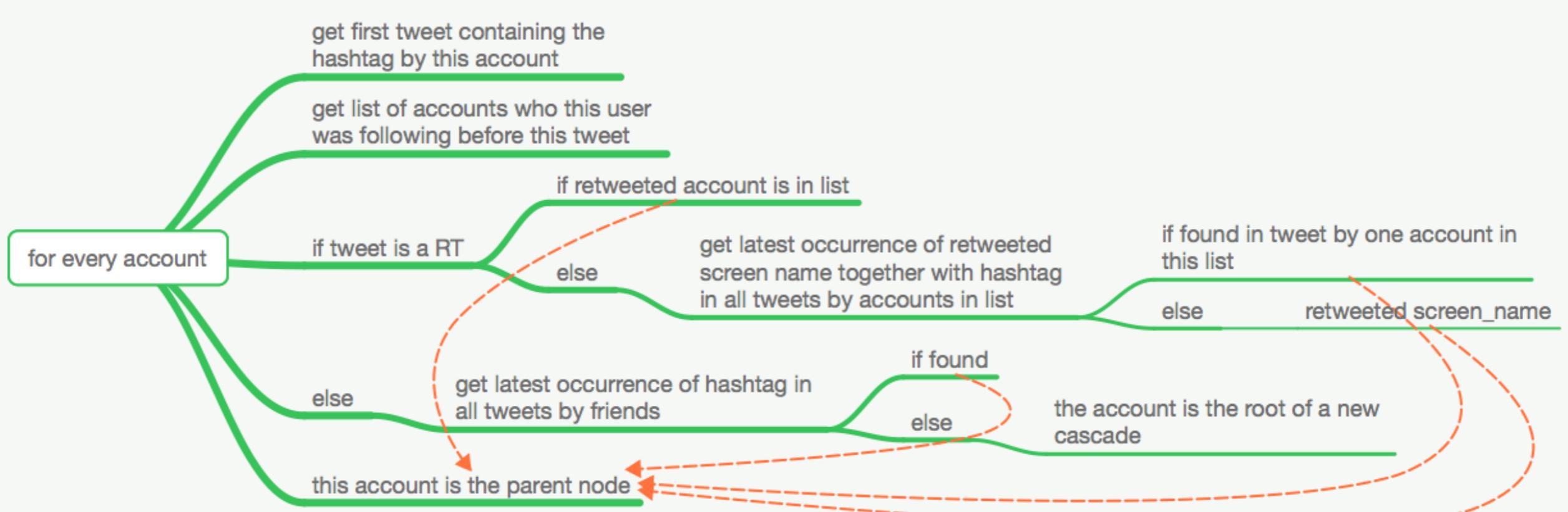
- tweet data collected with Twitter Capture and Analysis Tool (TCAT)
- following networks of first 10000 users using the hashtags collected with Python scripts
- reconstructed approximate following network at the day of the Sydneysiege
- merge following networks and tweet data in Neo4j
- reconstruct the diffusion cascades of both hashtags by means of Python and Neo4j

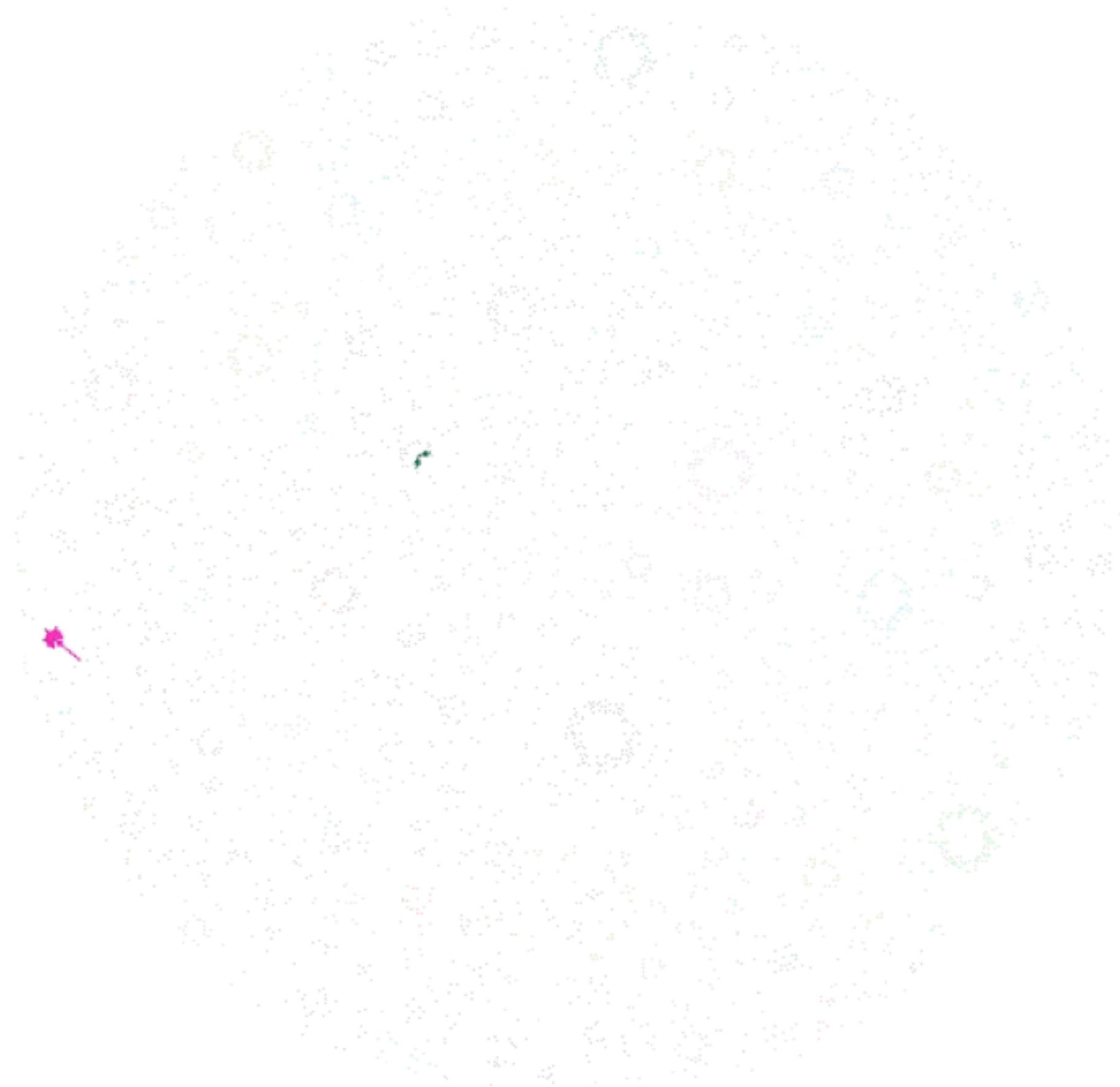
in progress:

- analyse them with Gephi and Python modules

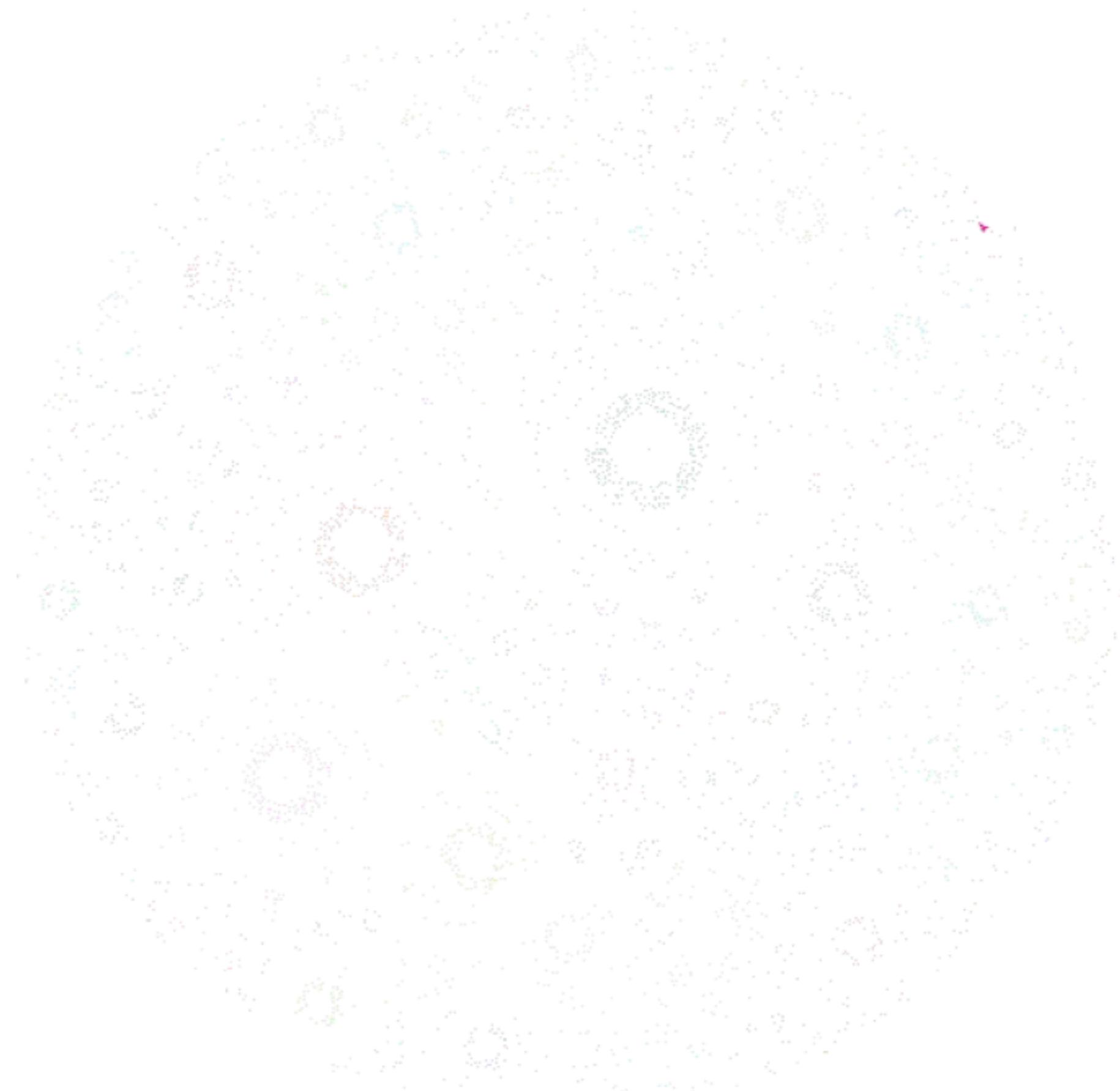




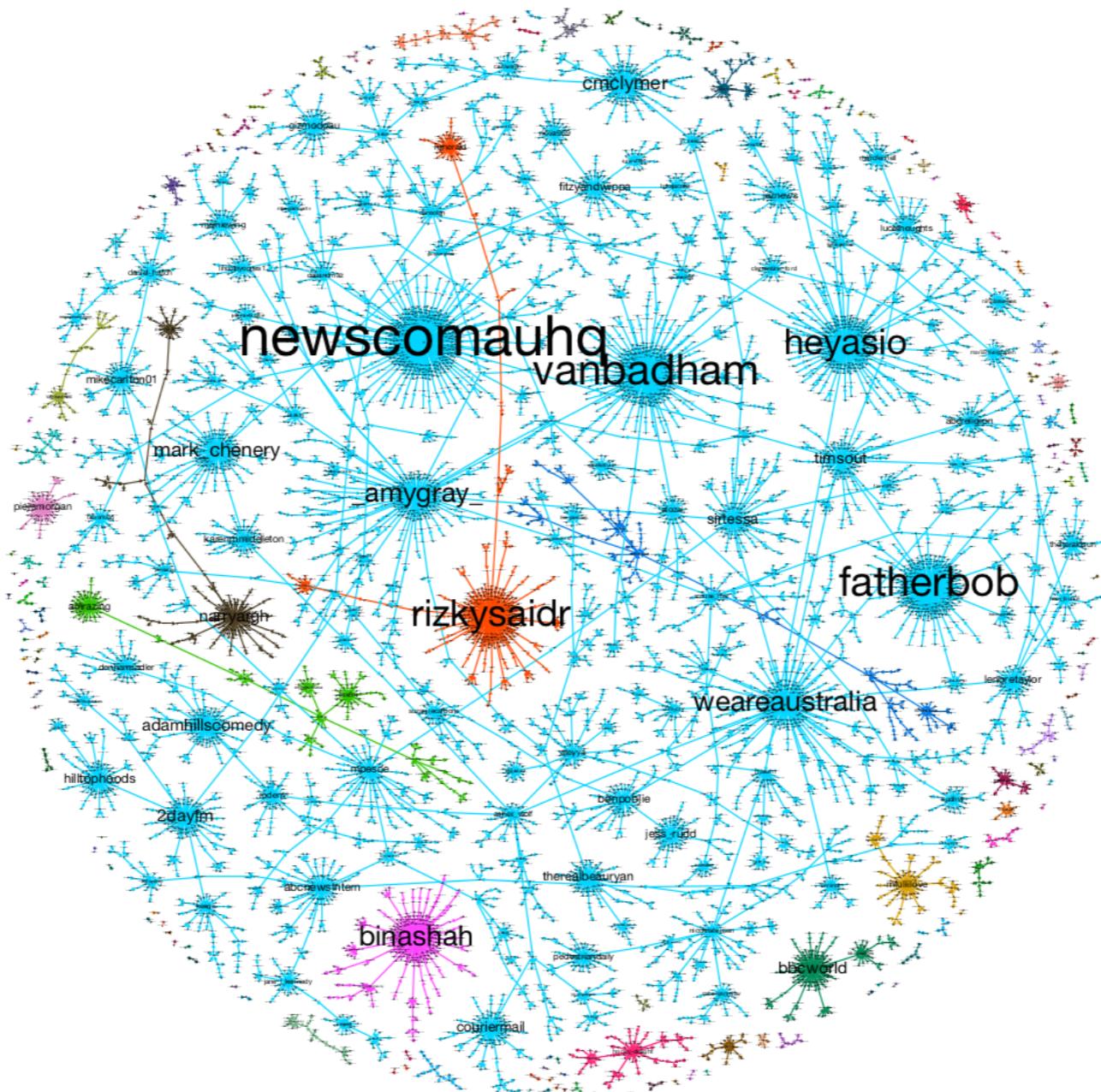




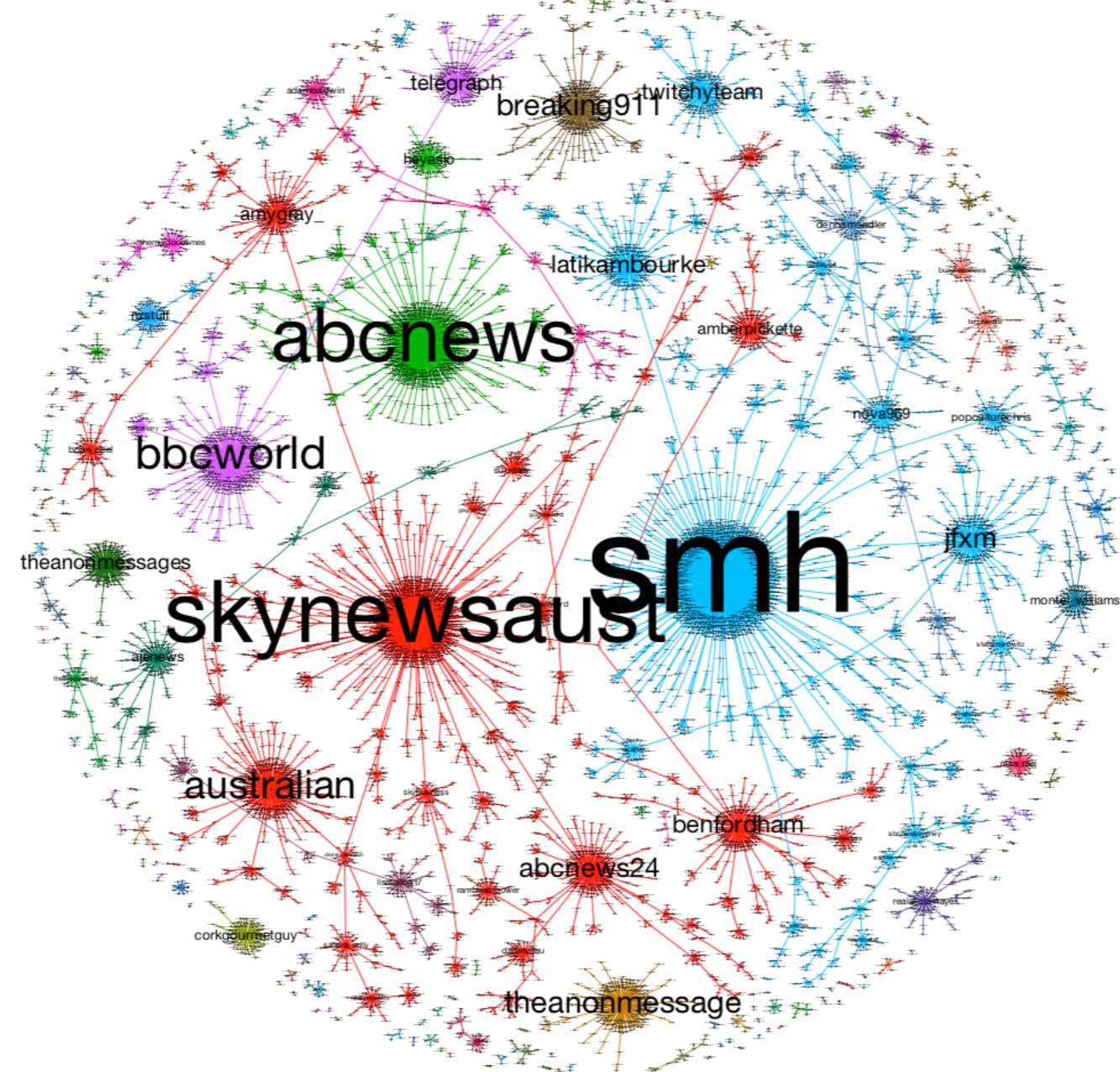
about.me/flxvctr, fvmuench@gmail.com



about.me/flxvctr, fvmuench@gmail.com



Average Path length: 4.20, Diameter: 16, Average Degree: 1.962, Number of Weakly Connected Components: 178



Average Path length: 2.95, Diameter: 13, Average Degree: 1.948, Number of Weakly Connected Components: 244

next steps in study

- analyze complexity of contagion (over time)
- find key moments/accounts (e.g. complexity drops)
- include linked websites and pictures in the analysis
- explore more (multi-layer-)network-methods, e.g. examine role of news websites in spread of hashtag

next steps in PhD project

- find topics for the next test studies
- scale up and improve the tools used during the first test study
- conceptualise and simulate first models

thx 4 your attention space!

my questions:

- Do you have any questions?
- Would you like to or do you use network methods? Why (not)?
- Efficient ABM in Python?
- Why should I learn R/igraph?
- Anybody interested in collaborations?
- Any ideas for next two projects?
- Theories about network structures?
- Experience with multilayered network methods?
- Any more comments?

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extras

TOOLS

challenges

- usability
- scalability
- sustainability

Evaluation and expected usage

Tool	Usability	Scalability	Sustainability	Usage
Gephi	+++	+	++	analyse and visualise data
Google BigQuery	++	+++	+	TrISMA ARC LIEF, GDELT
MySQL	++	++	+++	storing self-collected data
Neo4j	++	++	++	data processing, storage, exploration, filtering, access, and analysis
Python (C++ embedded)	++	+++	+++	collect data, connect data sources, filter, process, and analyse data
Graph-tool	++	+++	++	analyse and visualise data
NetworkX	++	++	+++	analyse and visualise data
Snap.py	+	+++	+++	analyse and visualise data
C++	+	+++	+++	high performance analysis and agent-based modeling

Methodology

The contraposition of quantitative and qualitative methods, which dominates the method discussion in sociology, rather distracts from the actual problems.

Luhmann, 1997, p. 37

pragmatism

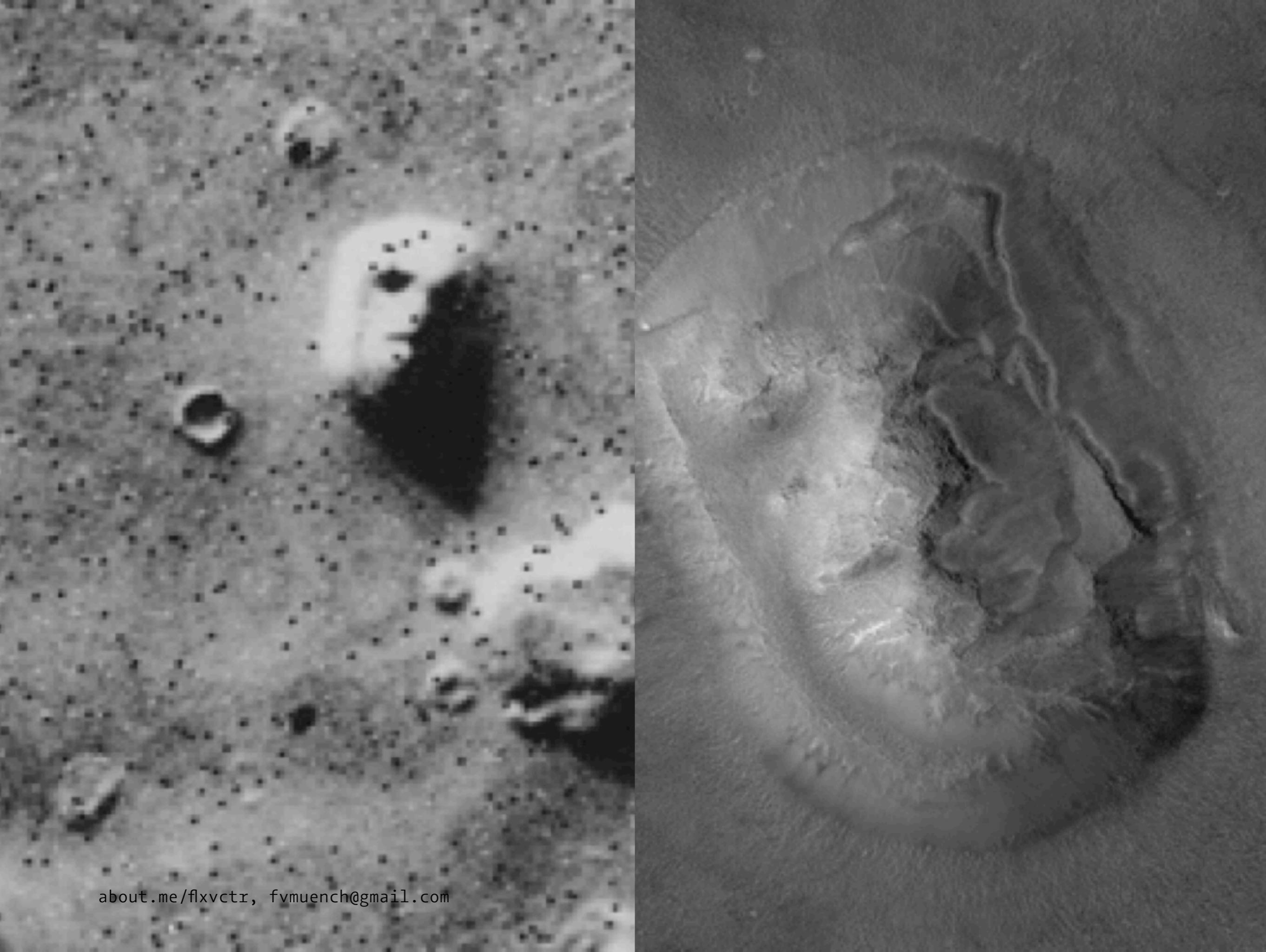
- focus on consequences of actions
- problem-centred
- pluralistic
- real-world practice oriented
- methods are validated by their "usefulness"

(Creswell, 2014, p. 43)

abductive reasoning

- **abduction:** create hypotheses with our human ability for heuristic pattern recognition
- **apophenia:** “the experience of seeing connections and patterns where there are none and ascribing excessive meaning to these situations”

(Dixon, 2011)



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abductive reasoning

abductive reasoning always has to be backed by **induction** or **deduction**

(Dixon, 2011)

data sources

besides the Twitter API:

- Australian Twitter News Index (ATNIX) by Axel Bruns
- Australian Twitter Userbase by Social Media Research Group (SMRG) at QUT
- “Australian Firehose” by TrISMA
- traffic data on Australian news websites by Experian Hitwise
- user flow data by Fairfax Digital
- GDELT

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