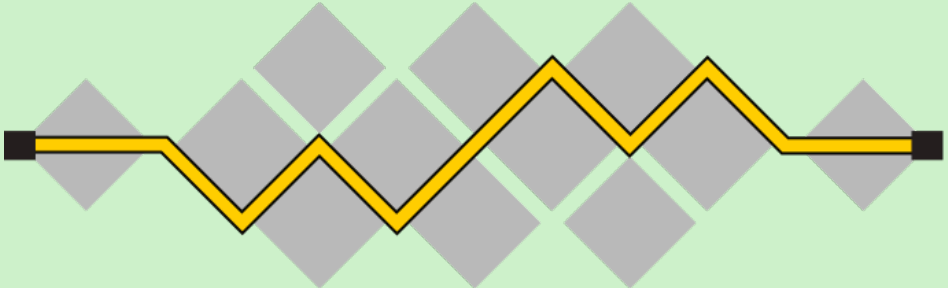


# Communication Patterns in a Long Standing Hierarchy

Matthew Russell Barnes, Mladen Karan, Stephen McQuistin, Colin Perkins, Gareth Tyson, Ignacio Castro, Richard Clegg - 07/2023

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**I E T F<sup>®</sup>**

- Internet Engineering Task Force
- Social graph of mailing list interactions
- Person IDs collating similar email addresses together

Basic Statistics

**10,319 nodes**  
**557,236 edges**  
**21/06/2012 - 17/04/2021**

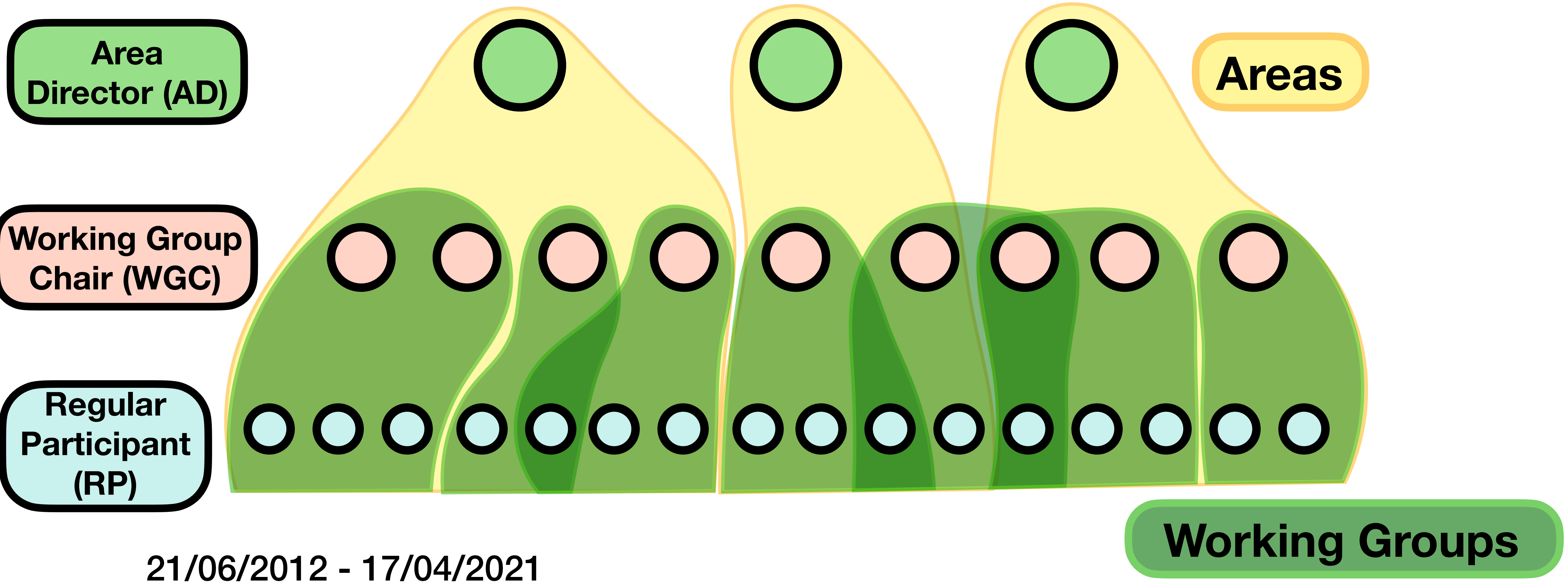
Active Nodes in Last Year



The Web We Weave: Untangling the Social Graph of the IETF, Proc. ICWSM, P. Khare et al. (2022)

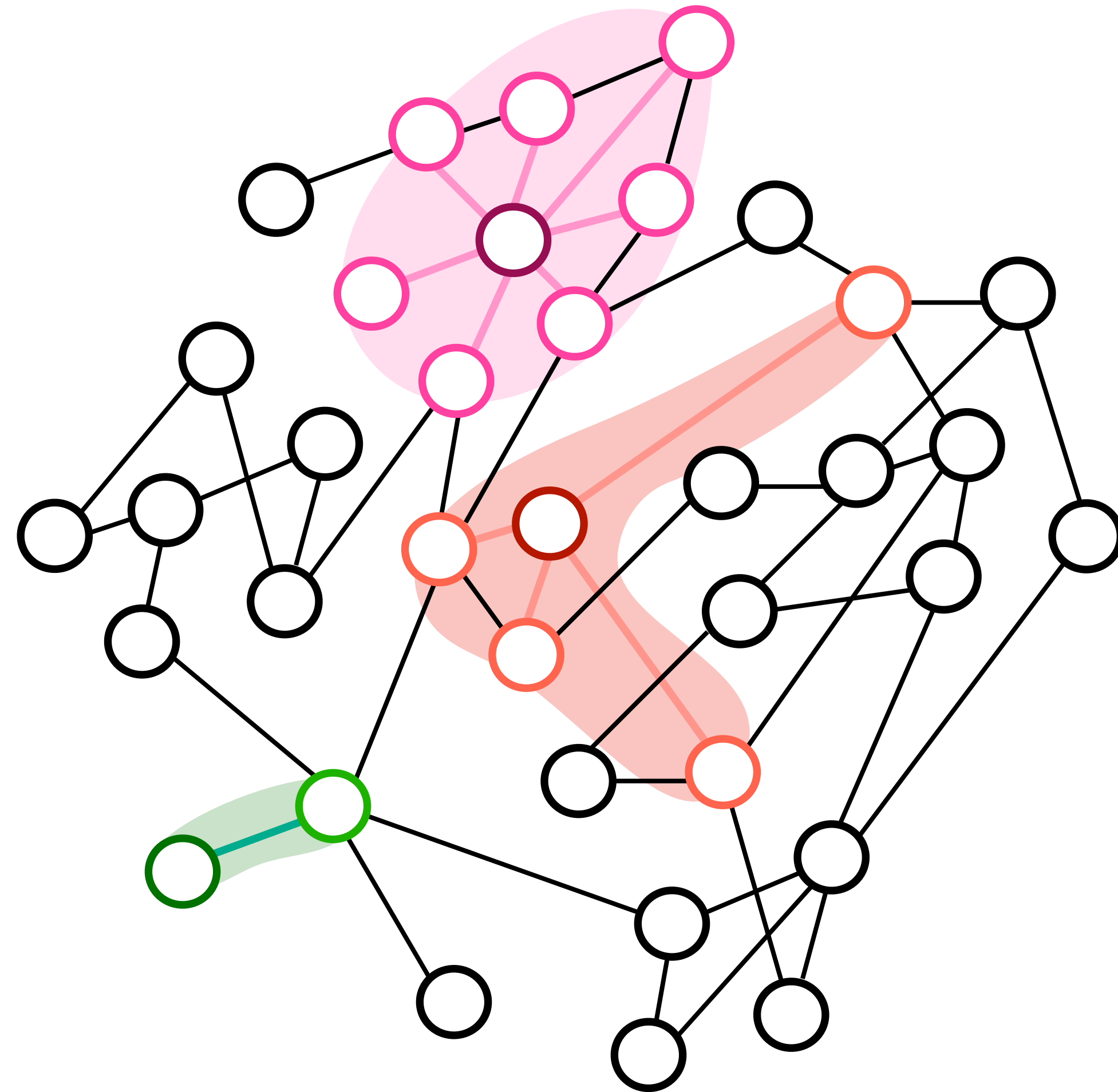


# Hierarchical Structure

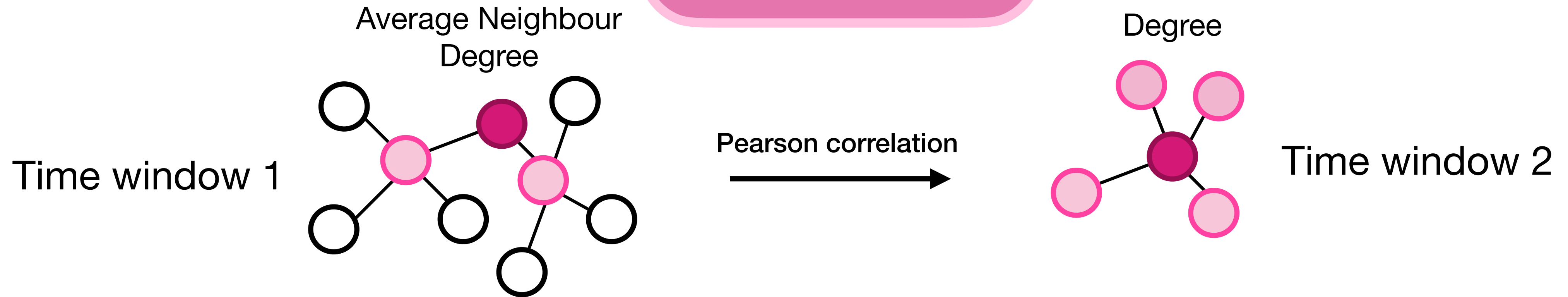


# Motivation

- Determining the influence **individual participants** have on the **communication** of their **neighbours**
- **Interdependency** between **participant communication activity**

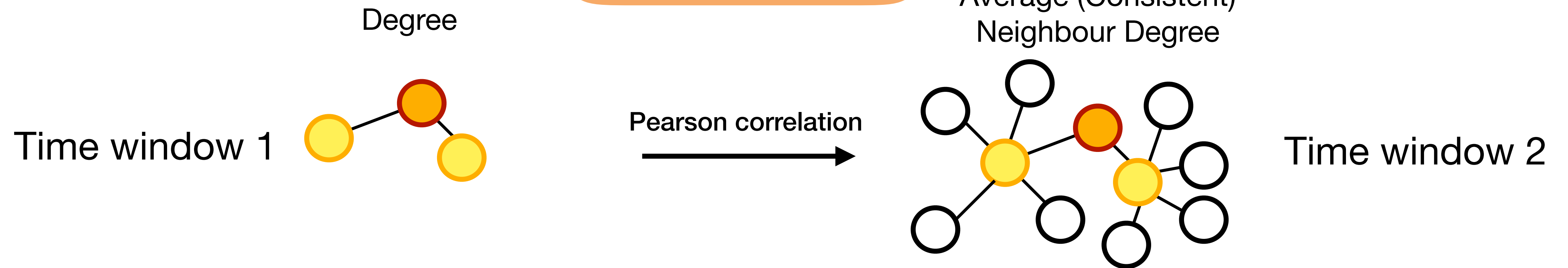


# Community



- **Positive Correlation** (*Communitarian*)
  - Active neighbourhood **helps** individuals into discussion, and inactive neighbourhoods **dissuade** discussion
- **Negative Correlation** (*Individualist*)
  - Individuals are **stifled** by an active neighbourhood, and **thrive** in an inactive neighbourhood

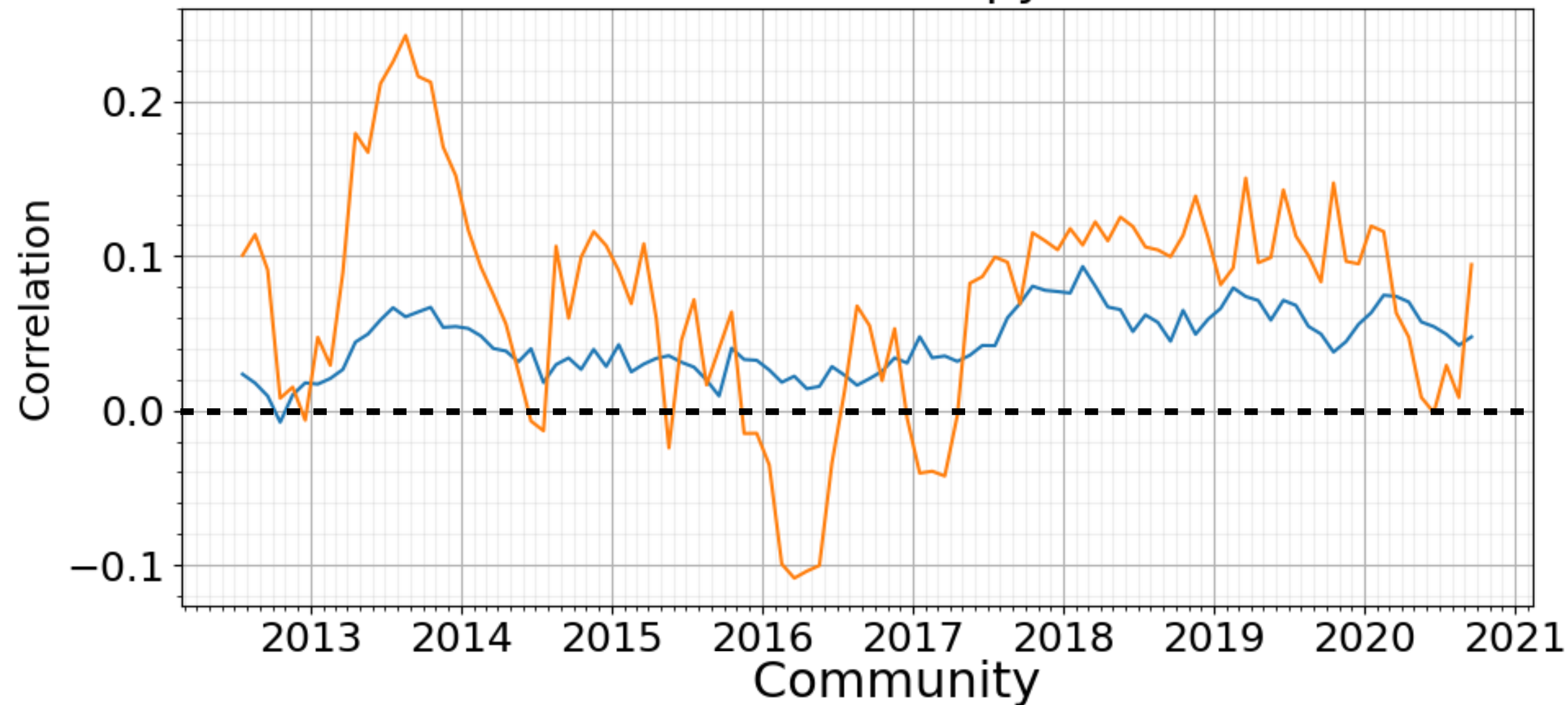
# Philanthropy



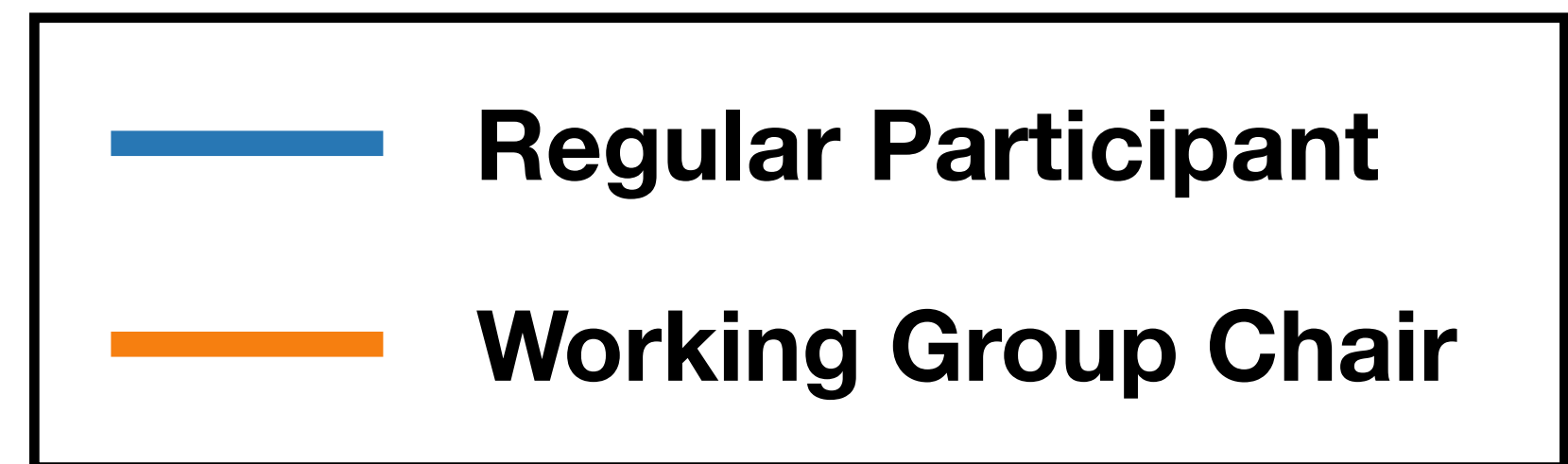
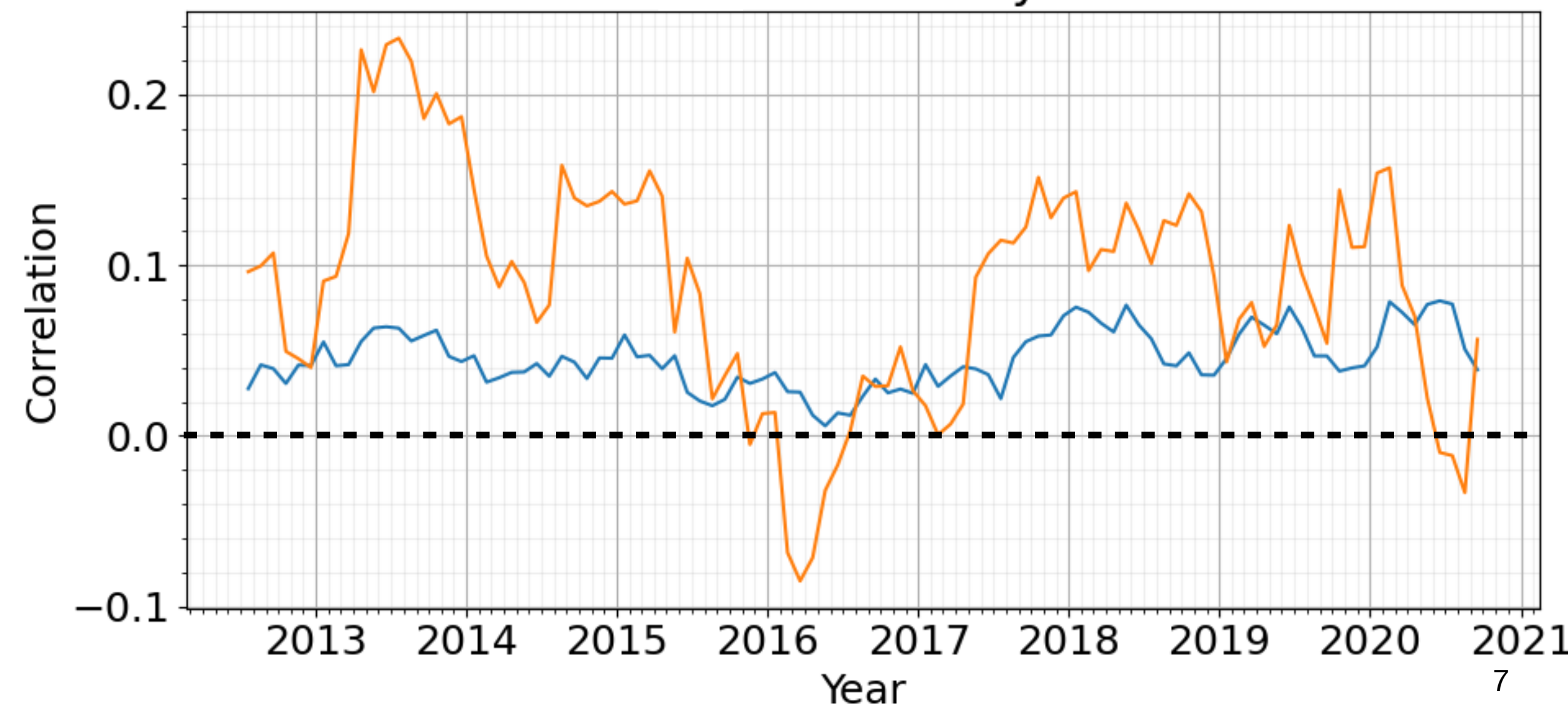
- **Positive Correlation** (*Philanthrope*)
  - Active individuals **help** neighbourhoods into discussion, and inactive individuals **dissuade** discussion
- **Negative Correlation** (*Prima Donna*)
  - Neighbourhoods are **stifled** by active individuals, and **thrive** with inactive individuals

# How do people higher in the organisation hierarchy impact their most direct contacts?

Philanthropy



- Increased effect **on** and **from** neighbours' degree
- Especially for **Community**
- Suggests a “**facilitator**” role for WGCs



## **Working group chairs** may be good **facilitators**

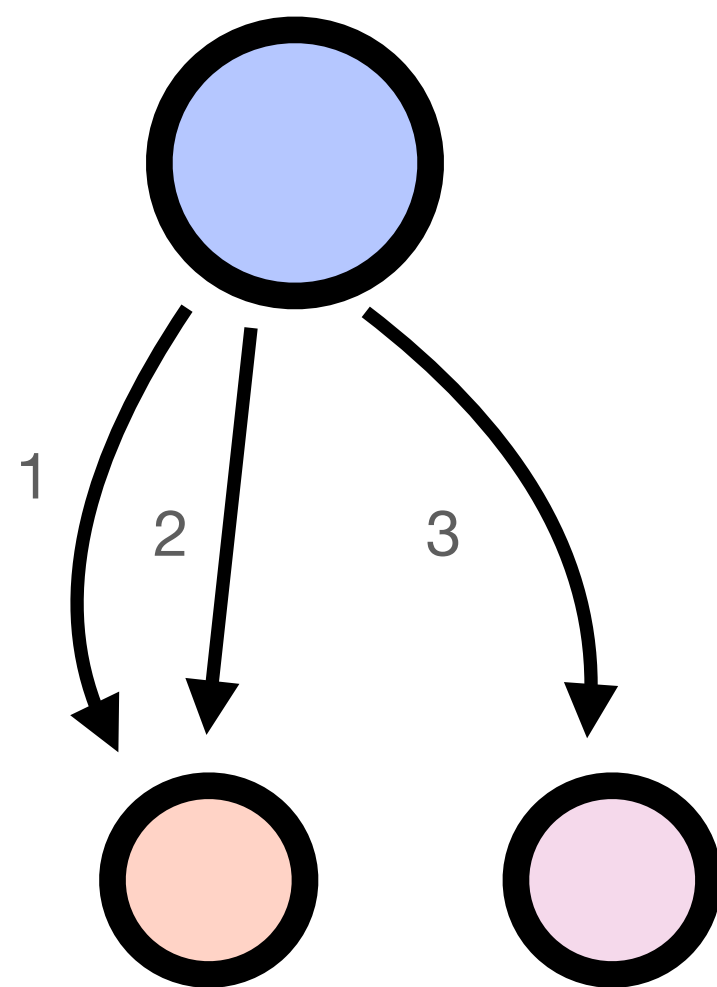
- They respond **more positively** to their **neighbours' activity** compared to **regular participants**
- And their **neighbours** respond **more positively** to theirs
- But, this does not account for **direction of communication**
- The **directed motifs** of **organisation wide communication** may tell a **different story**

How do different **hierarchy levels** communicate with the **wider organisation?**



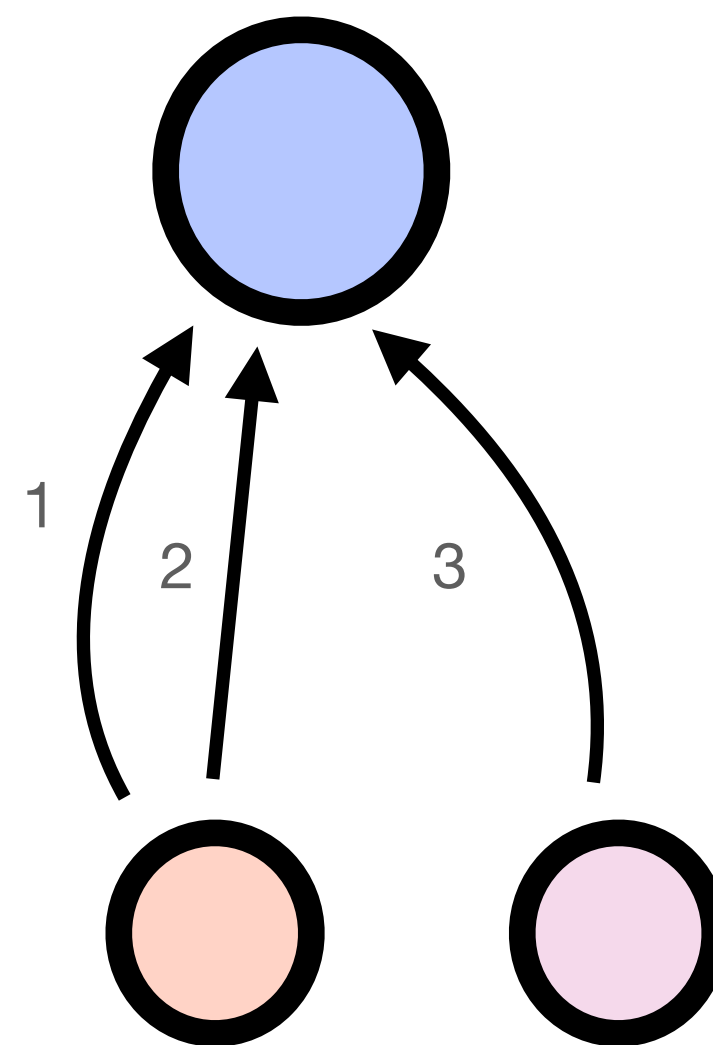
# Temporal Three-Edge Motifs

Outward Star



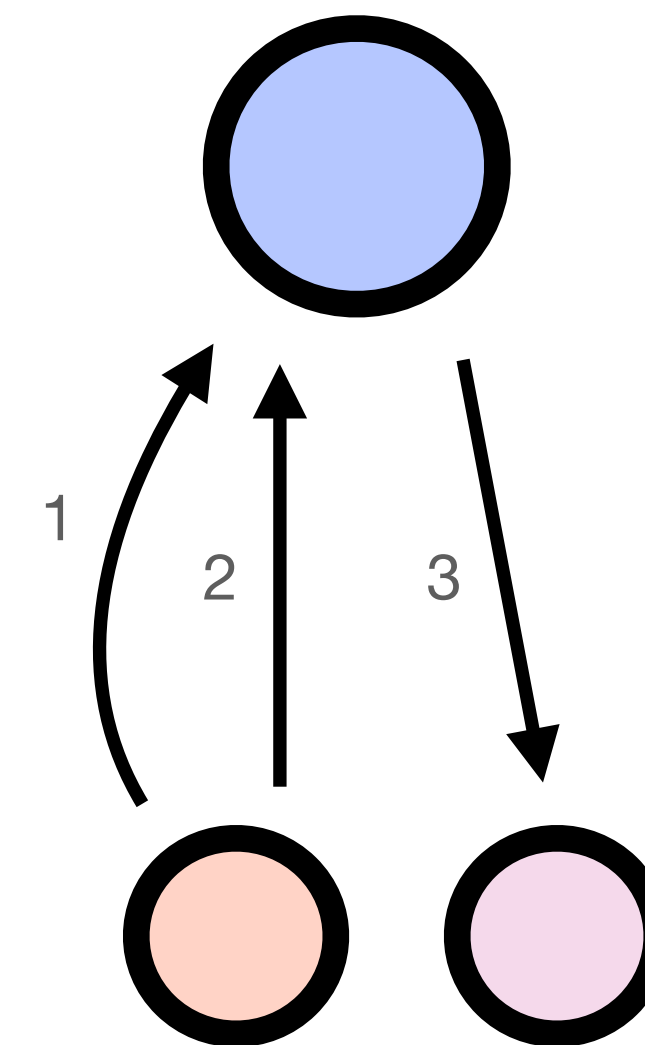
- Announcements
- Dissemination of Information

Inward Star



- Questions
- Condensing of Information

Mixed Star

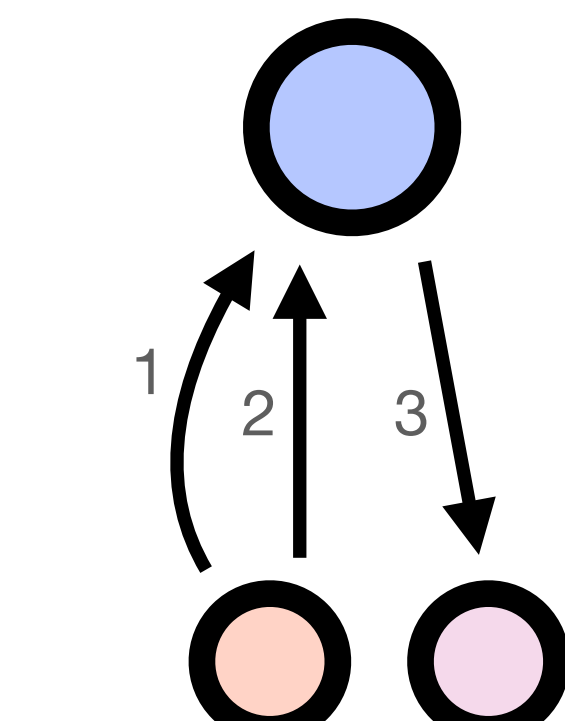
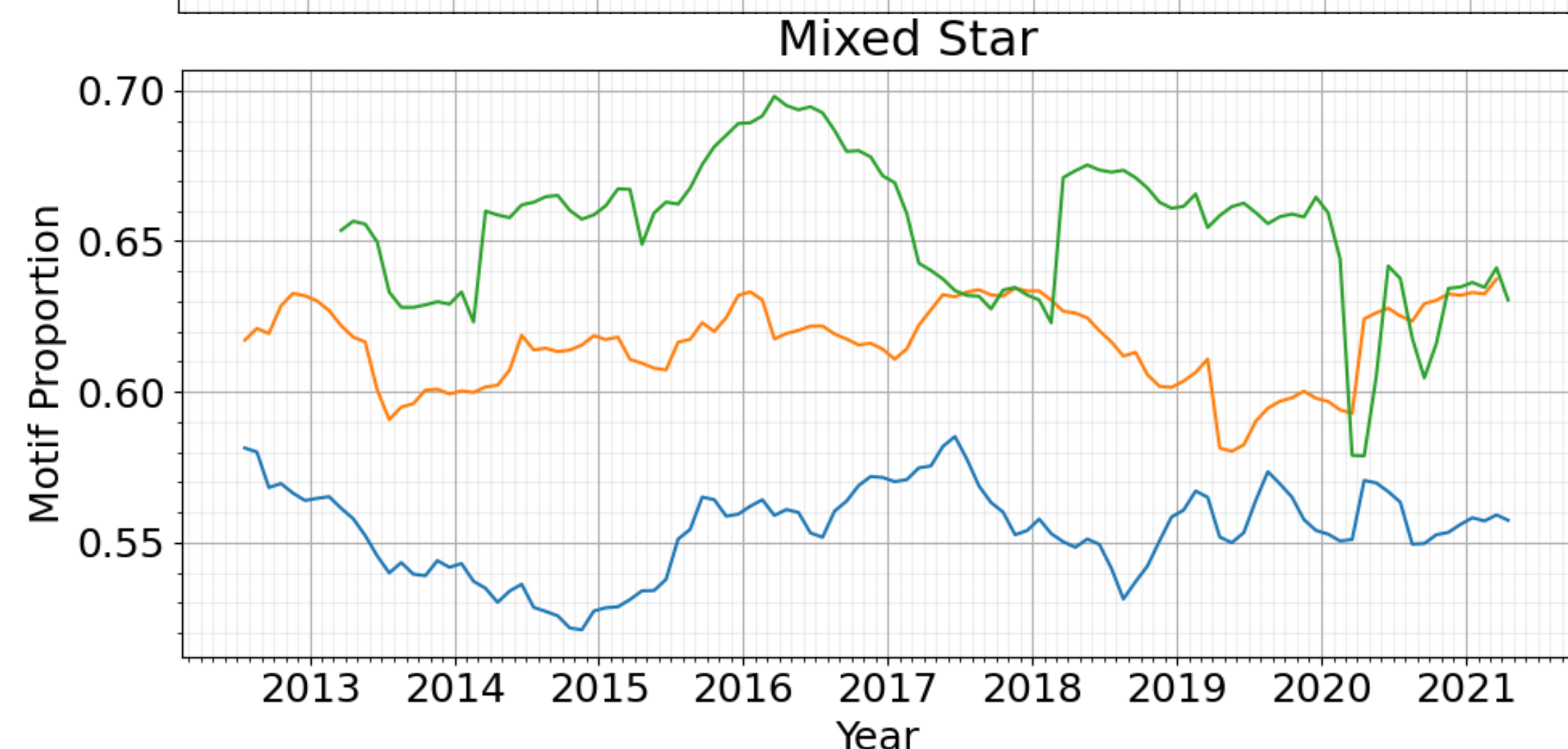
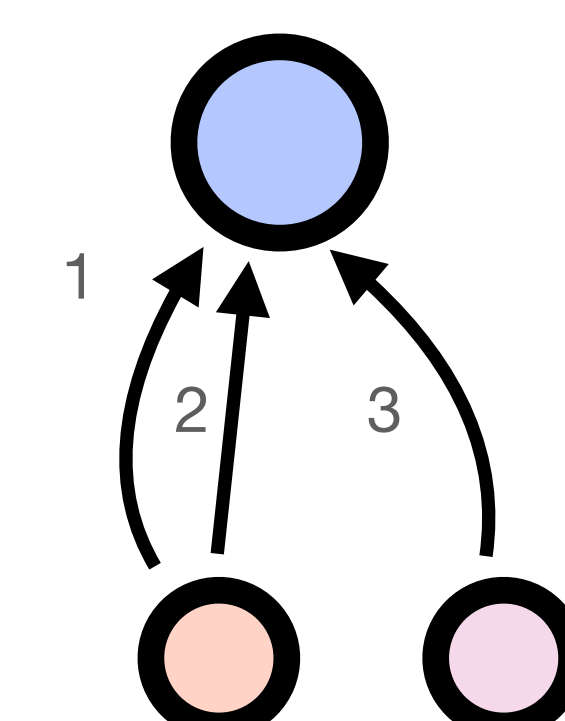
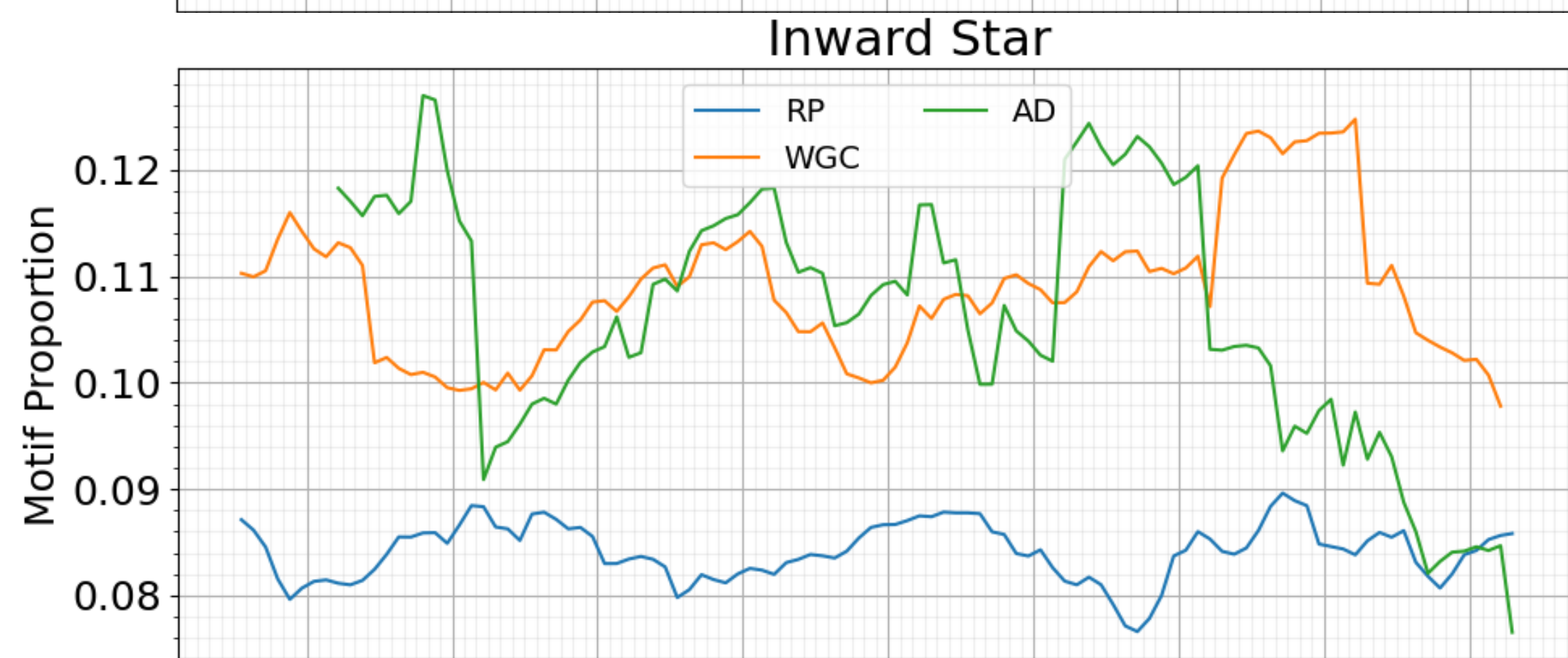
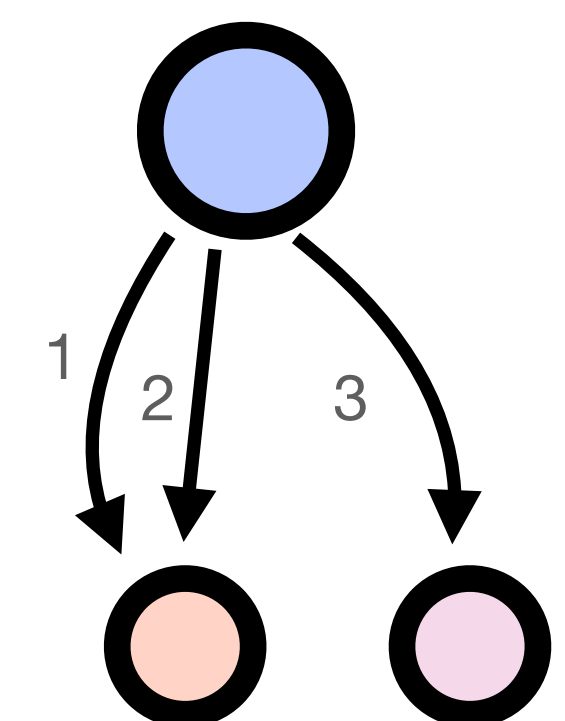
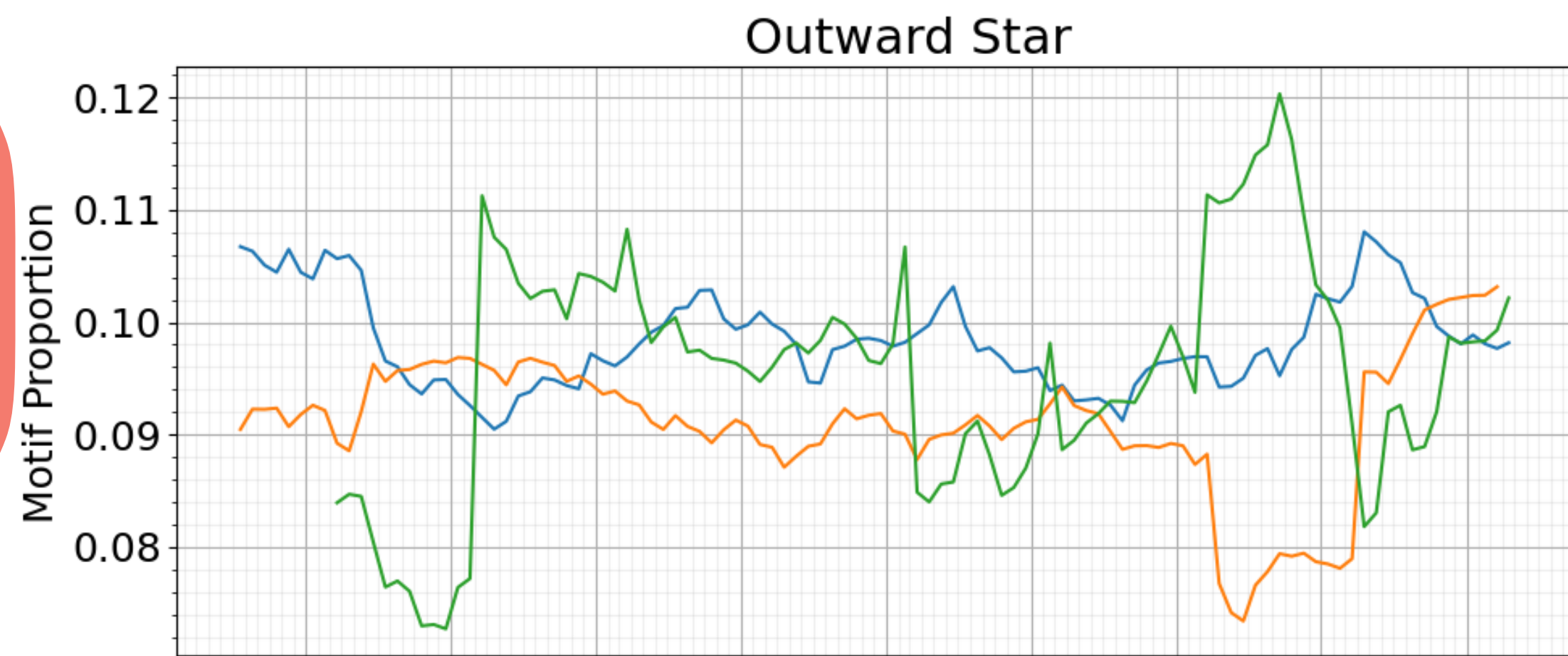


- Discussion
- Facilitation of Conversation

# Organisation wide hierarchy level communication patterns

- Higher hierarchy levels more experience a **larger** proportion **incoming** and **mixed** email motifs than **lower** levels.

- All levels have a **similar** proportion of **outgoing** email motifs



# Conclusions

- **Working group chairs are facilitators of discussion**
- In **working group** discussion, **regular participants** send **out more** than they **receive in**
- And, **area directors** and **working group chairs** are **condensers** of discussion

**Any suggestions / questions?**

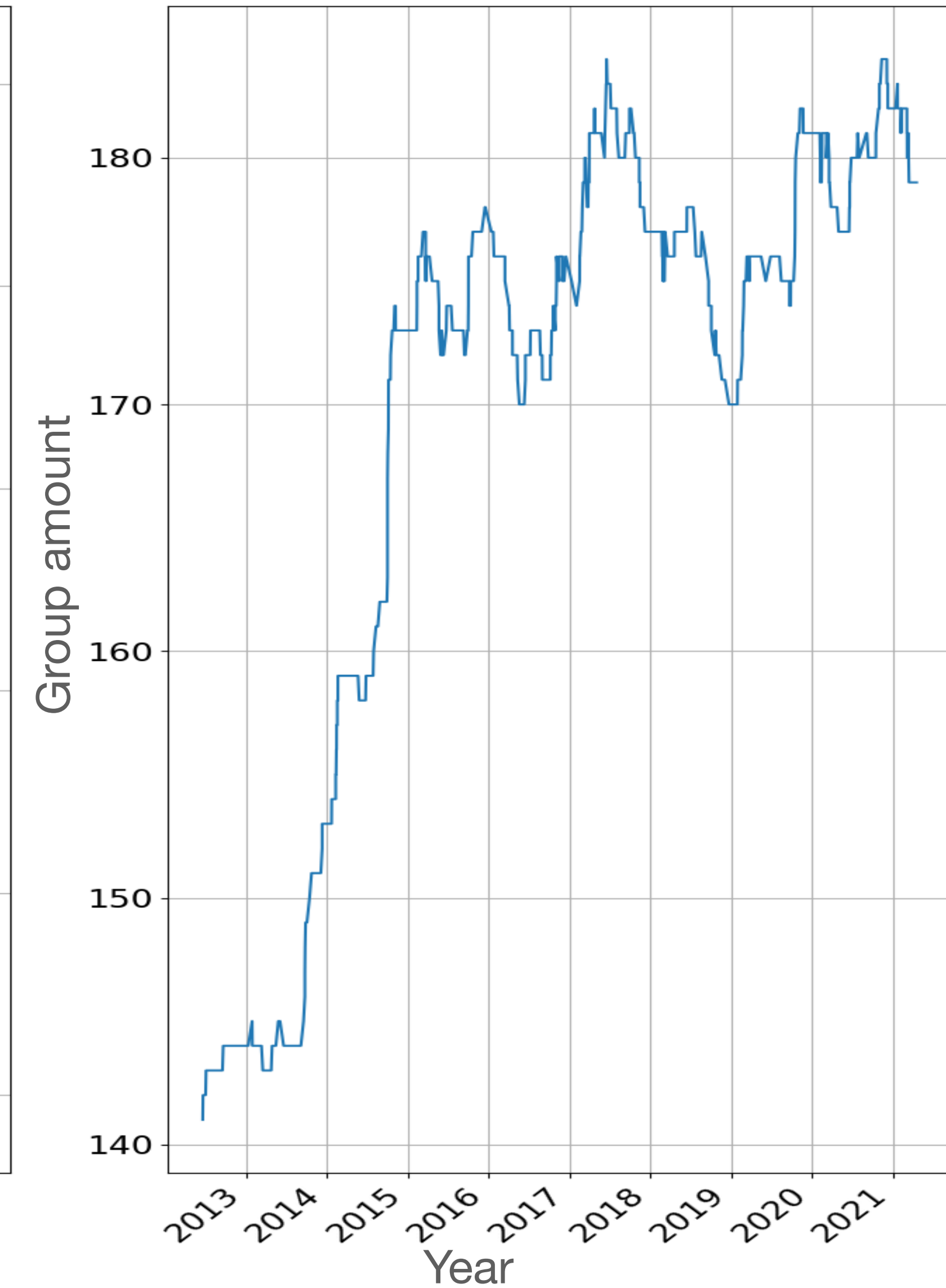
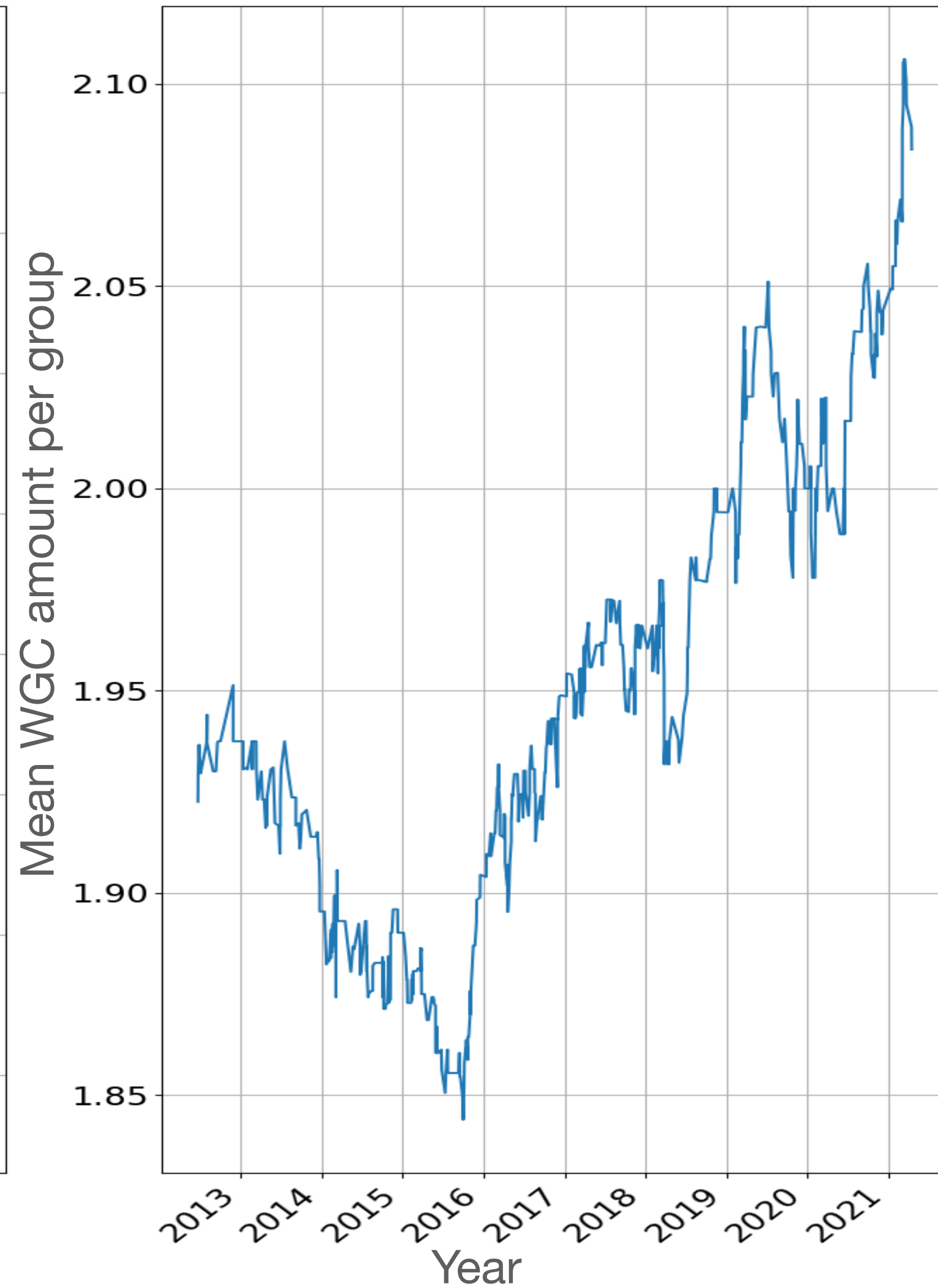
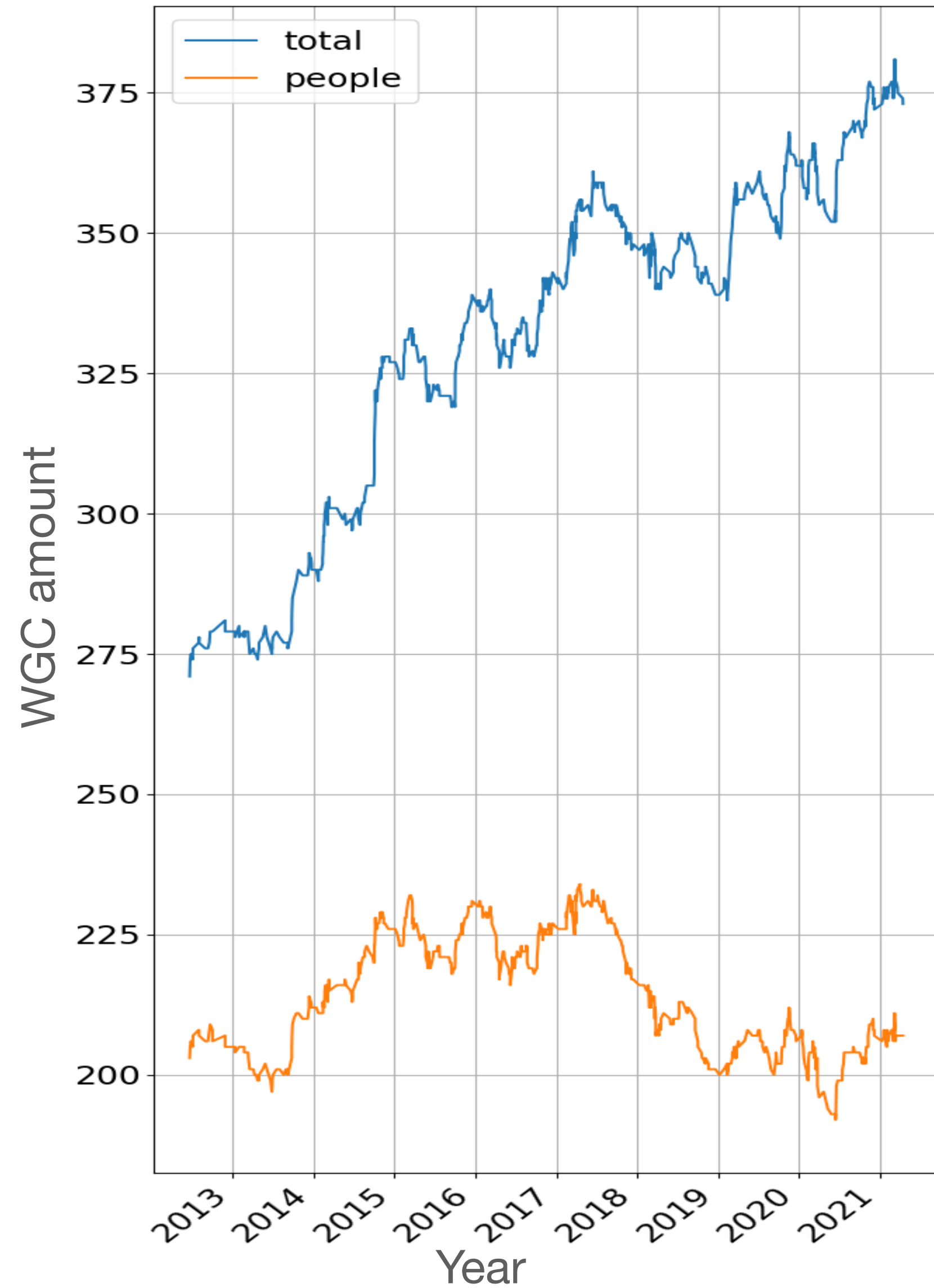
**Thank you**



**Queen Mary**  
**University of London**

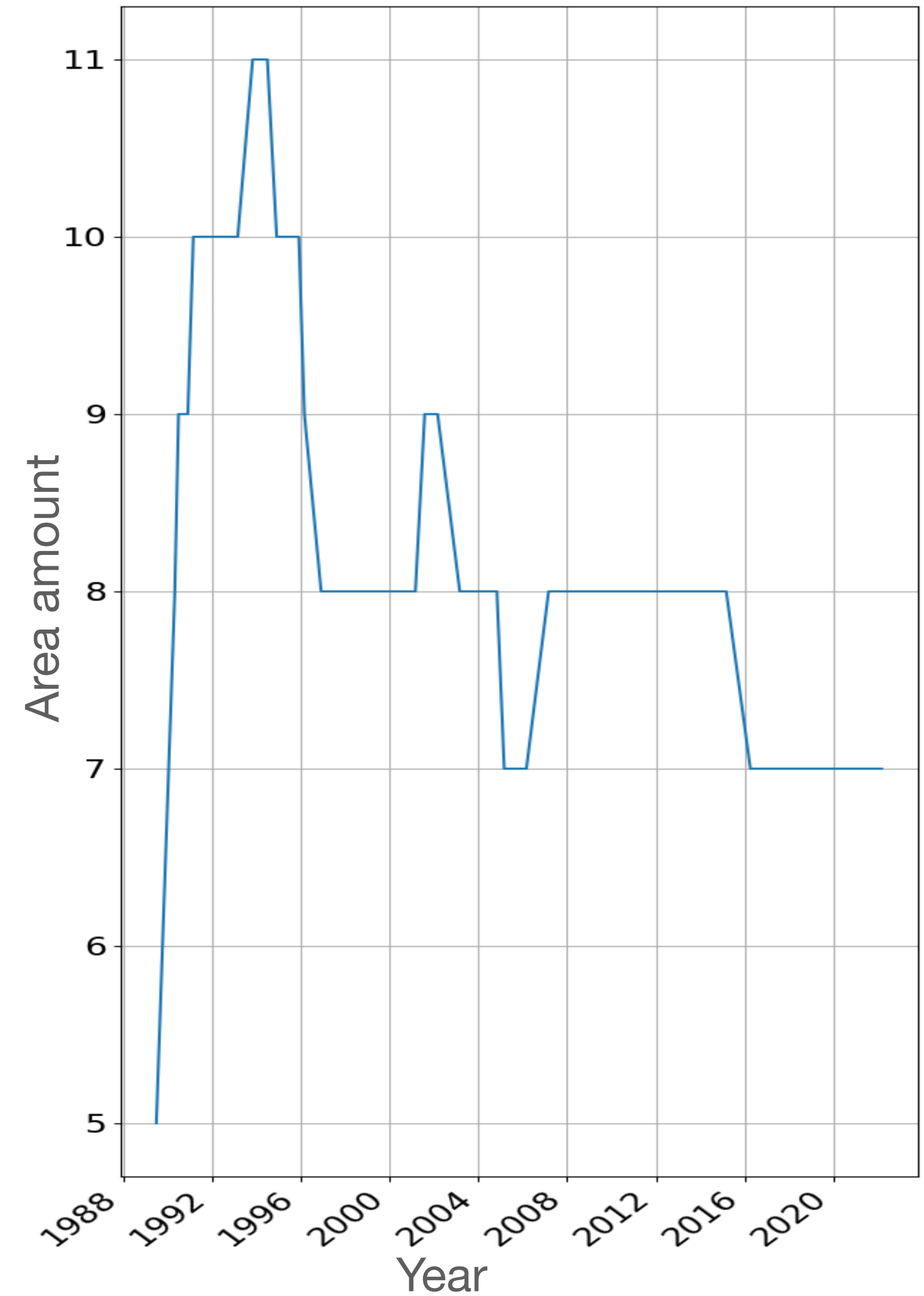
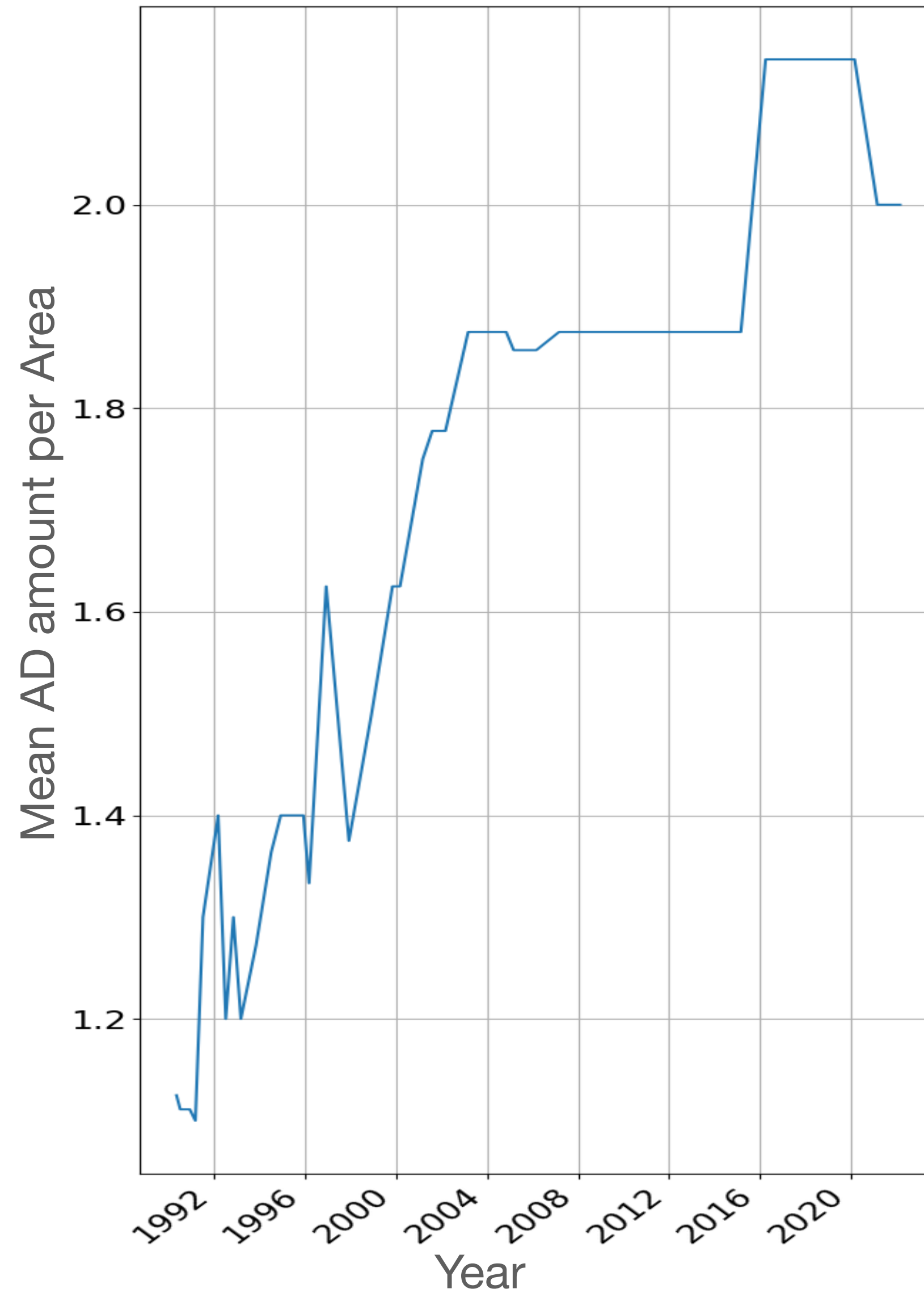
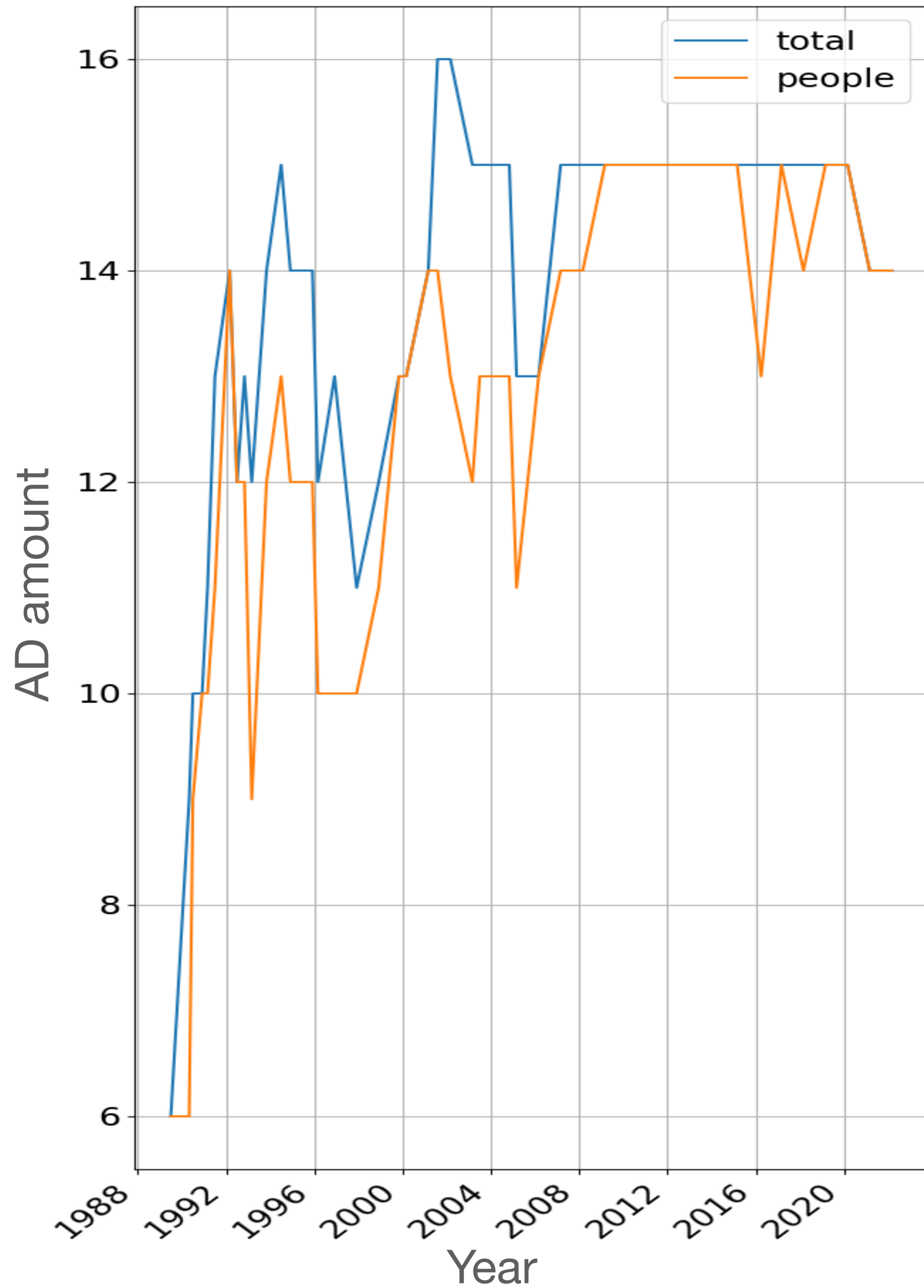
# RQ1: How does the hierarchy evolve over time?

- **More** working group chairs - about **+35%**



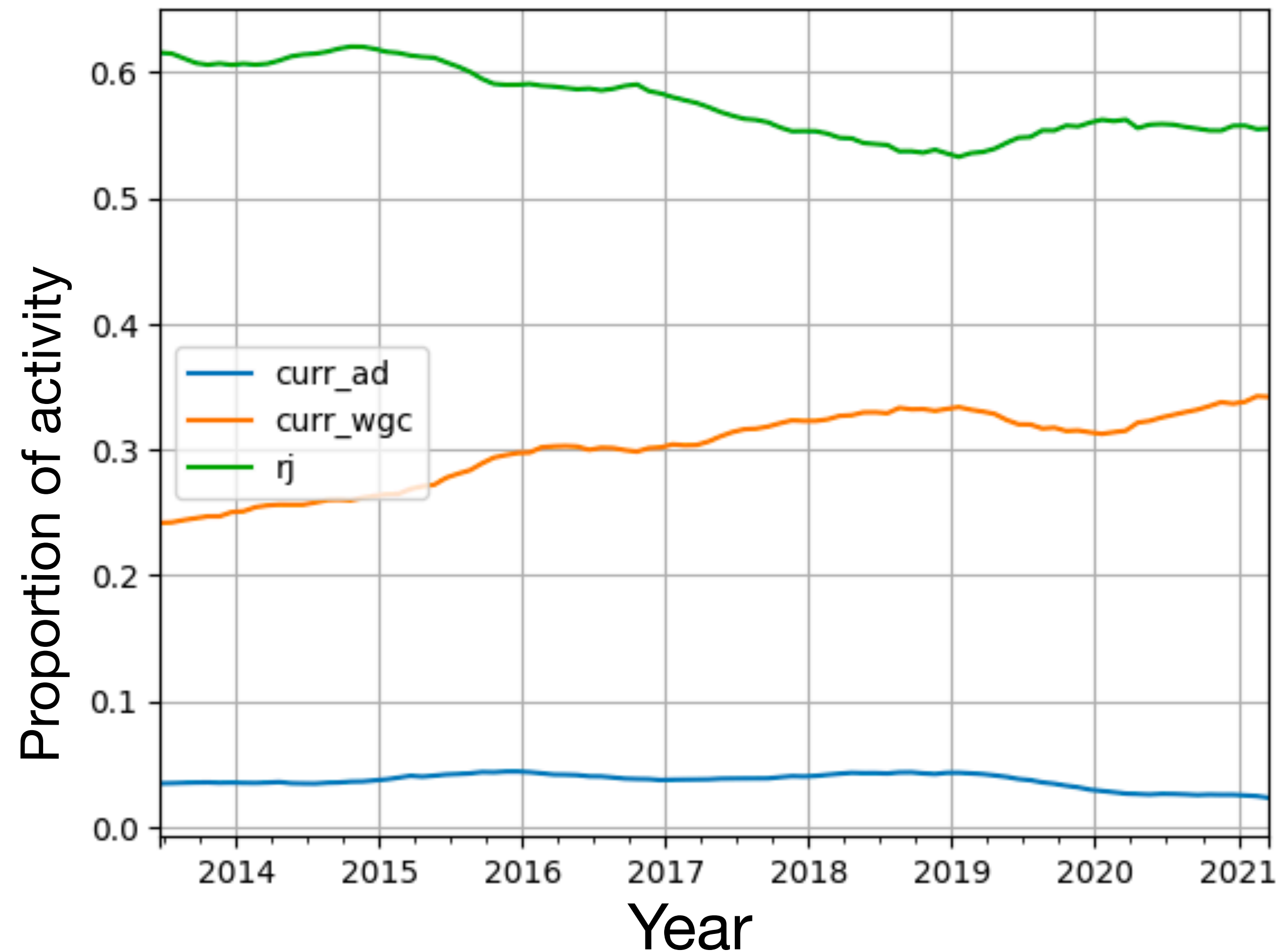
# RQ1: How does the hierarchy evolve over time?

- Little change in ADs since 2012



**RQ1: How does the hierarchy evolve over time?**

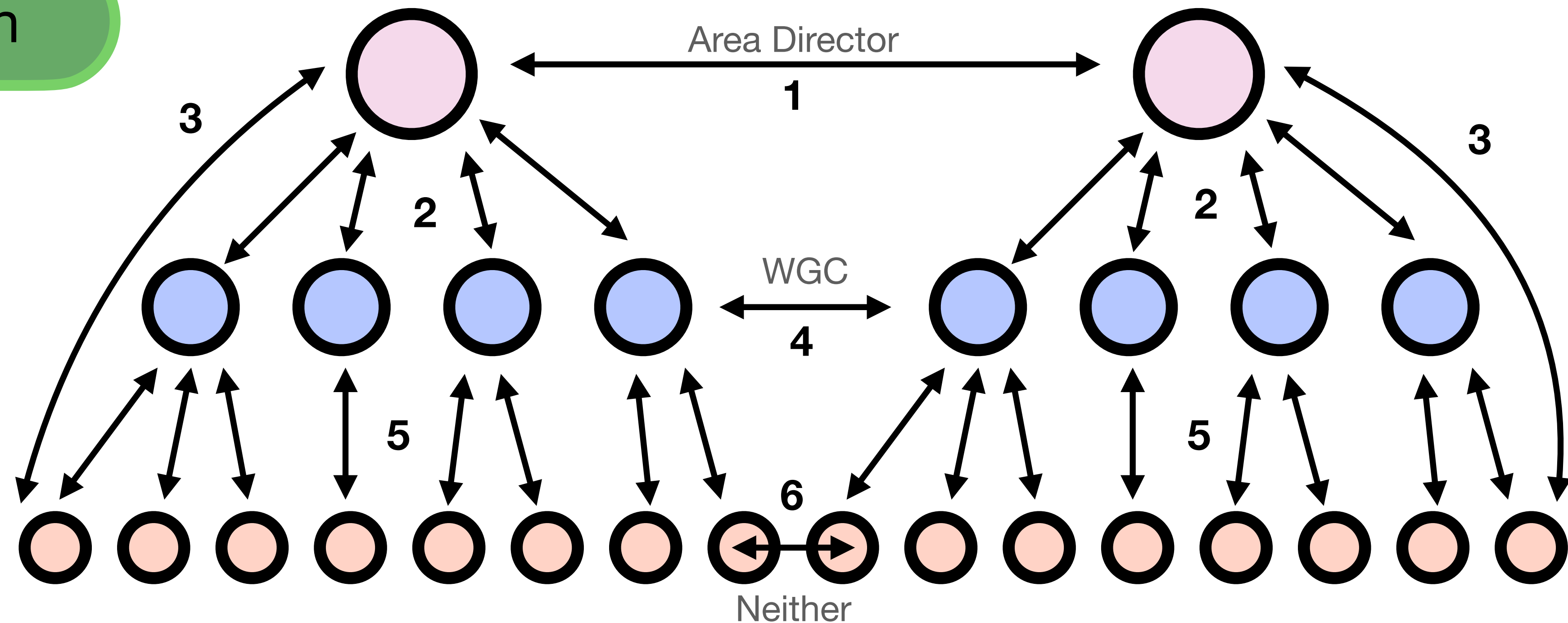
- WGCs are about **25-35%** of the total IETF activity
- ADs are **5%** of activity



# RQ4: How do people at different levels communicate, does information flow "up" or "down" the hierarchy?

- Grid of communication

	AD	WGC	NA
A D	1	2	3
W G C		4	5
N A			6



## Example:

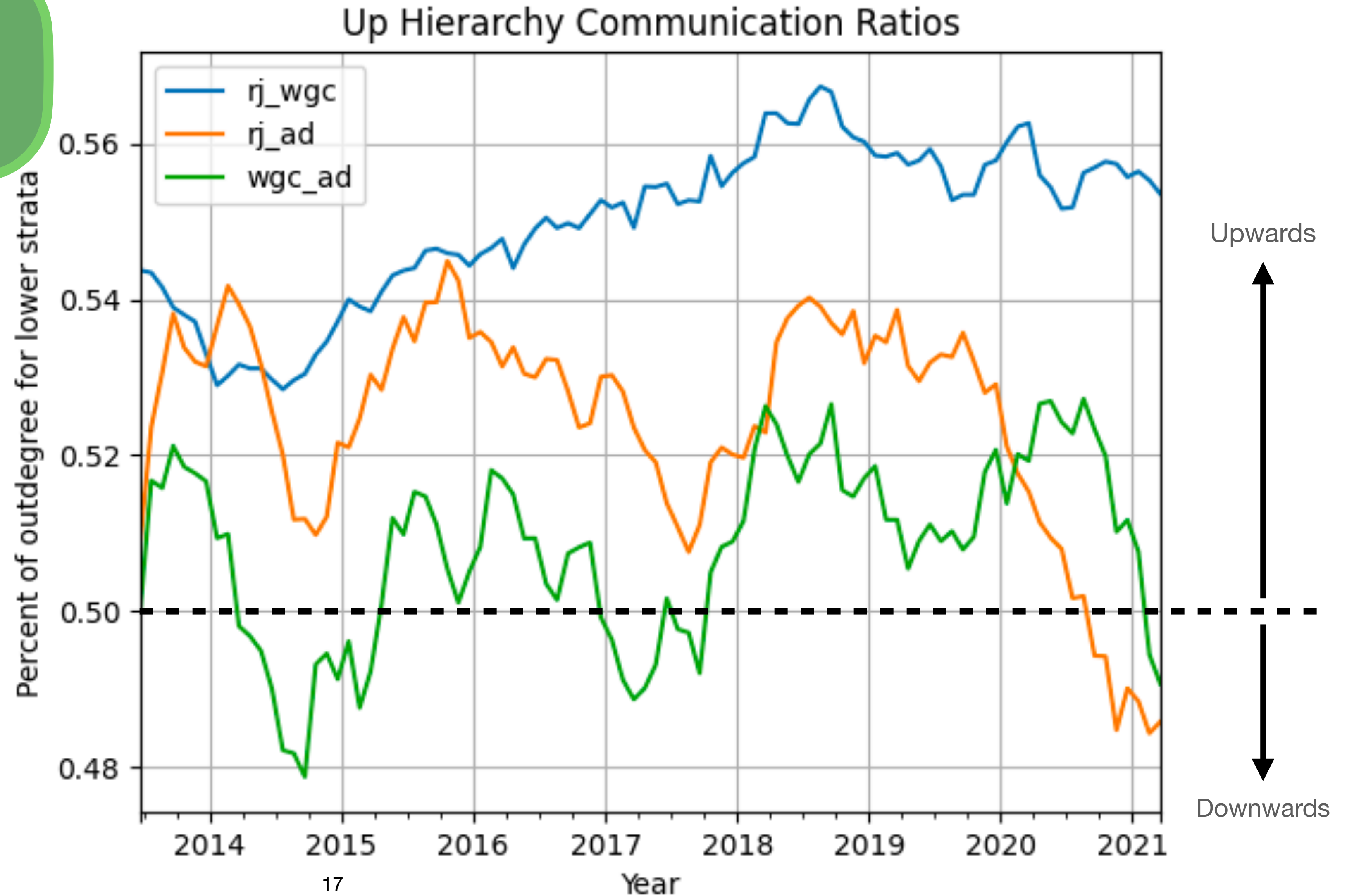
- Sum of all weighted edges from AD->WGC divided by the sum of all weighted edges from WGC->AD



# RQ4: How do people at different levels communicate, does information flow "up" or "down" the hierarchy?

- Ratio of communications inbound/outbound between strata

	AD	WGC	RP
AD			
WGC			
RP			



# RQ2: How does organisation hierarchy impact communication patterns?

## TODO

- Indegree vs outdegree
- Number of emails per month
- For WGC vs Not
- Before and after becoming WGC

