

# Creativity Workshop on “Visualization and Aggregation of Temporal Social Networks”

# Agenda

- 10:00–10:30 Introduction
- 10:30–11:30 Data and Related Work
- 11:30–12:30 Wishful Thinking
- 12:30–14:00 Lunch Break
- 14:00–14:45 Ideation
- 14:45–16:00 Storyboarding
- 16:00–17:00 Feedback Session
- 17:00–17:30 Conclusion

# Creativity Workshop

Guided activities that are meant to help us understand:

**How can visual representations help you?**

**How can visual analysis tools help you?**

# Creativity Guidelines

- Please mute your electronic devices
- All ideas are valid – express and record them!
- Think possibility – not implementation

**Be creative!**

# Introduction

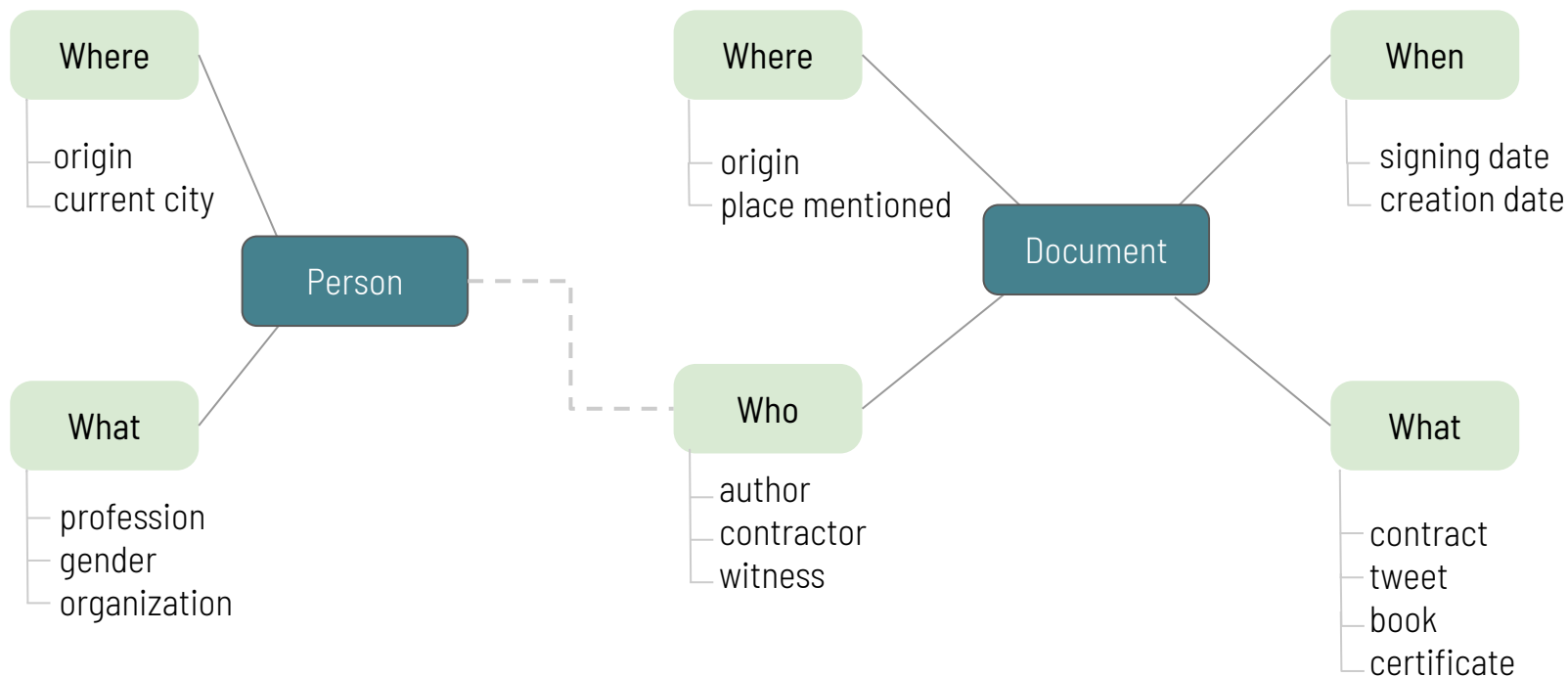
- Name
- Place of work
- Job/Profession
- What topics do you currently work on?
- If you could travel in time, which year/era would you travel to and why?

# Data and Related Work: Visualization of Groups in Dynamic Networks

# Communities vs Clusters vs Groups

- "A **community** is a social unit (a group of living things) with commonality such as norms, religion, values, customs, or identity. [...] Although communities are usually small relative to personal social ties, "community" may also refer to large group affiliations such as national communities, international communities, and virtual communities."
- "Clustering is the task of grouping a set of objects in such a way that objects in the same group (called a **cluster**) are more similar (in some sense) to each other than to those in other groups (clusters)."
- In this workshop, we will use the term **group** as a neutral term that simply describes a set of items

# Data abstraction

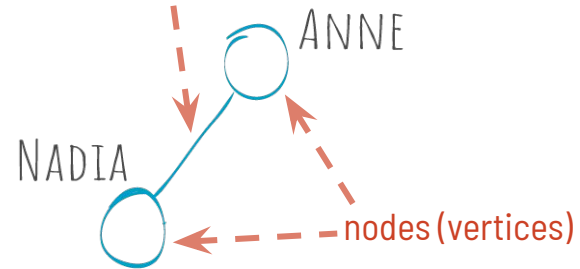
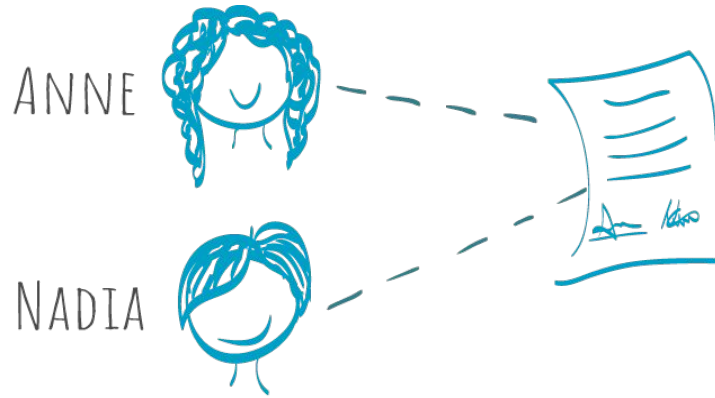




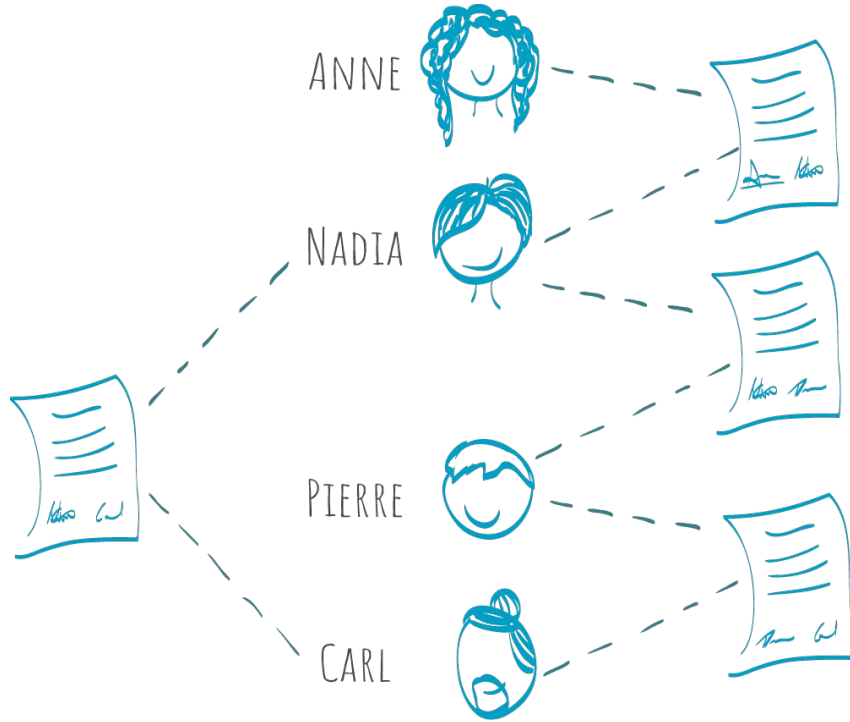
# Contracts: who signed a contract with who?

represent it as a graph

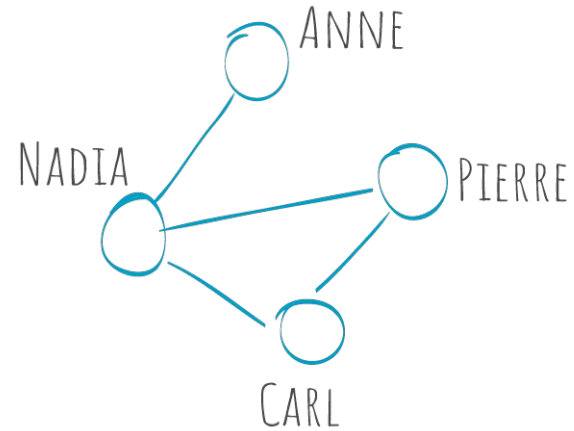
link (edge) between 2 nodes



# Contracts: who signed a contract with who?

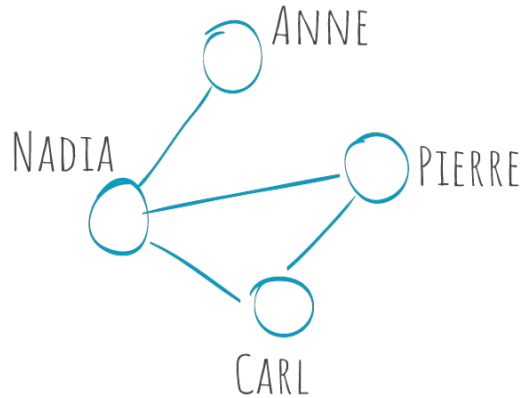


- Node-link diagrams



# Contracts: who signed a contract with who?

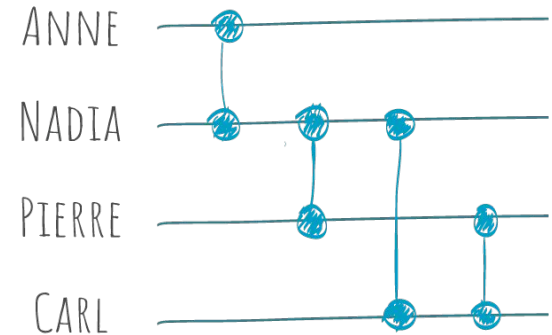
- Node-link diagrams



- Matrix

	ANNE	NADIA	PIERRE	CARL
ANNE				
NADIA				
PIERRE				
CARL				

- Biofabric



# People have attributes



- gender: female
- profession: shopkeeper
- hometown: London
- age: 42



- gender: female
- profession: designer
- hometown: Paris
- age: 33



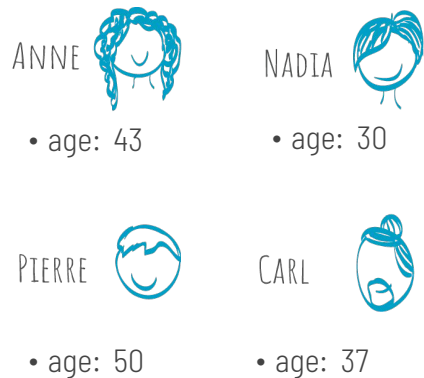
- gender: male
- profession: shopkeeper
- hometown: Rome
- age: 47



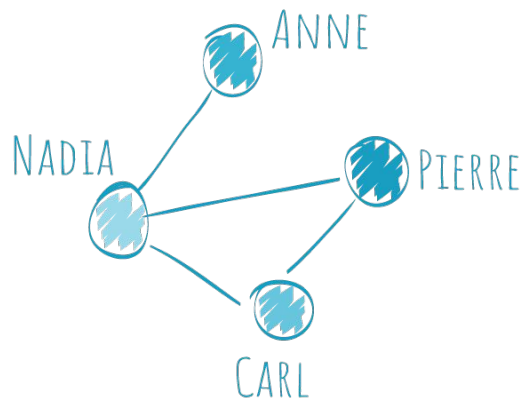
- gender: male
- profession: photographer
- hometown: Madrid
- age: 36

how to visualize them?

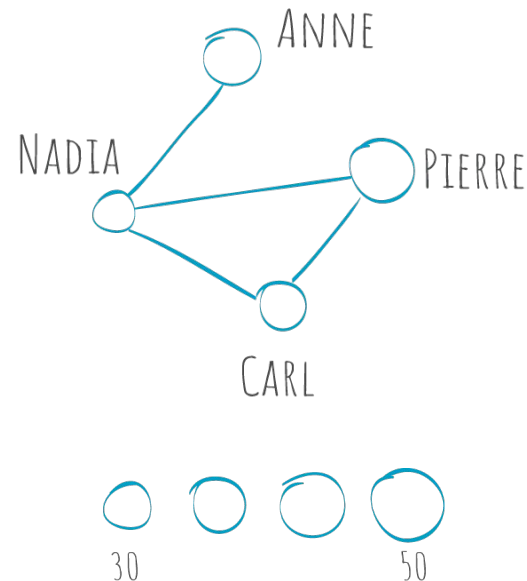
# Mapping people attributes > visual attributes of nodes



- Color intensity

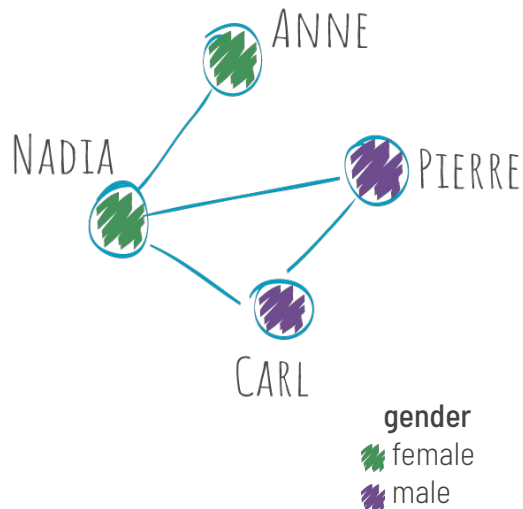
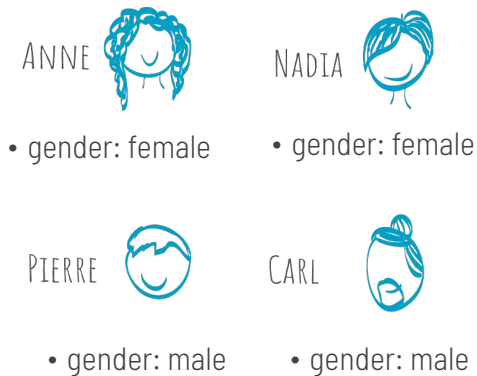


- Node size

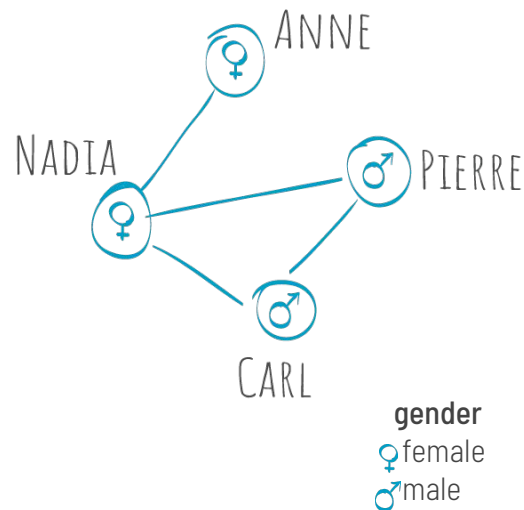


# Mapping people attributes > visual attributes of nodes

- Color

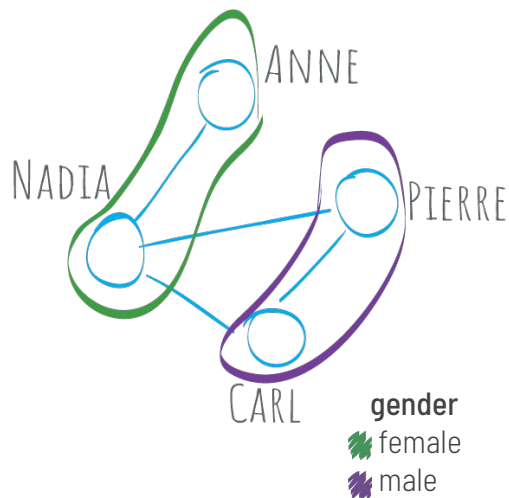
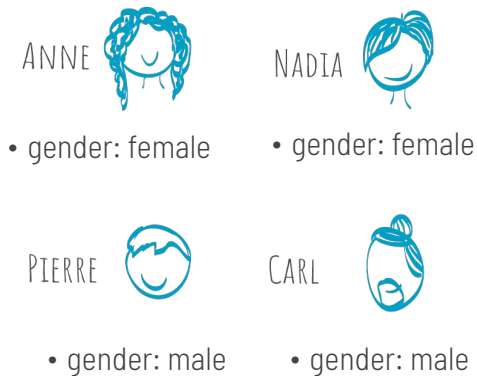


- Symbols

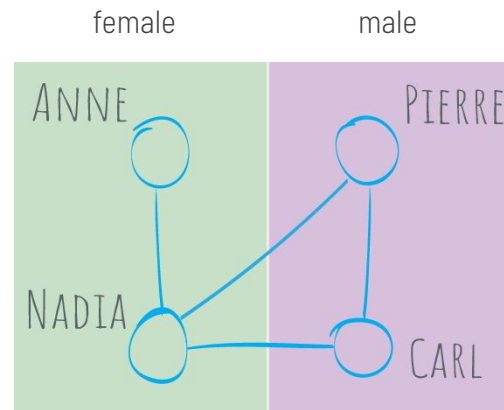


# Mapping people attributes

- Contour overlay

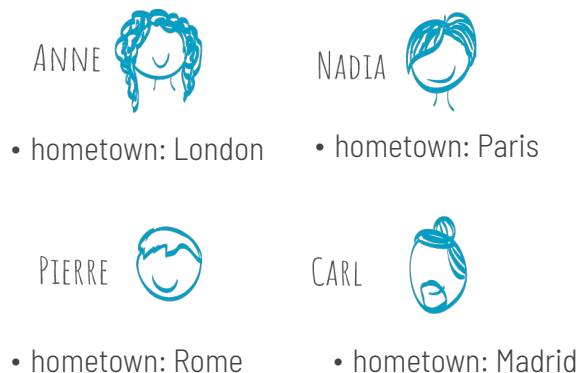


- Attribute-driven faceting



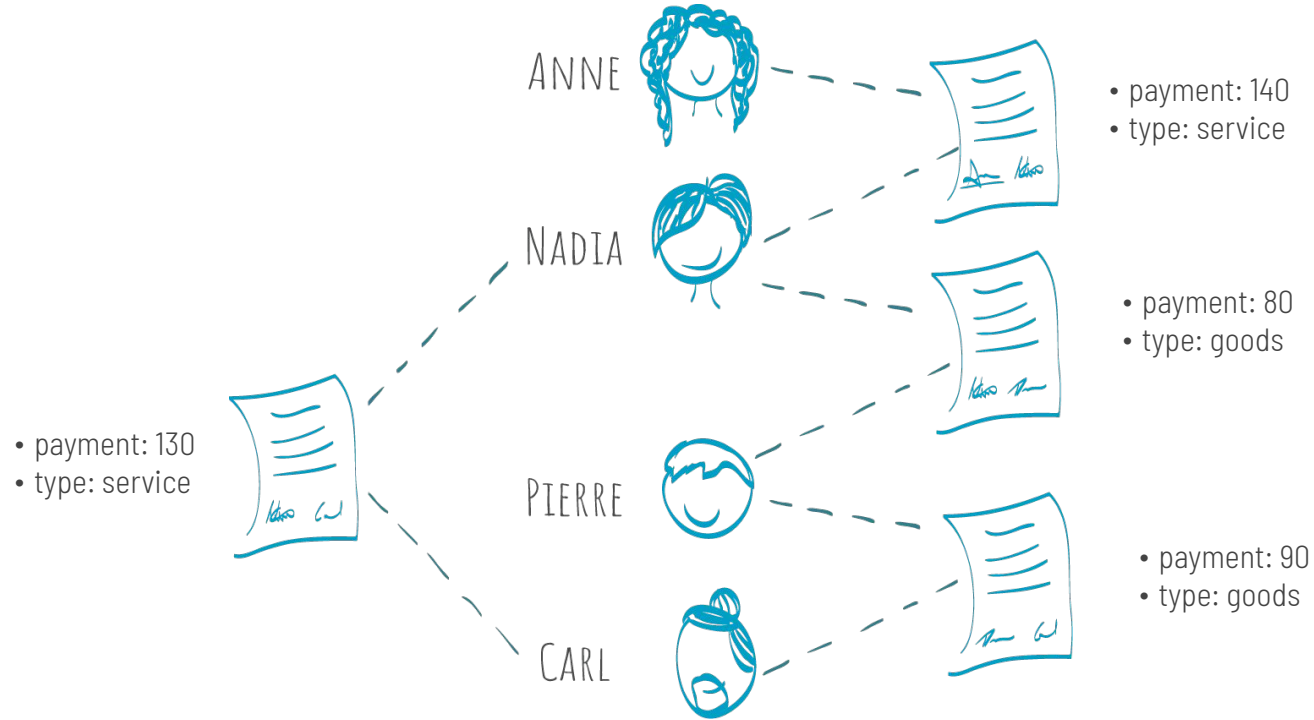
# Mapping people attributes

- Geographical attributes



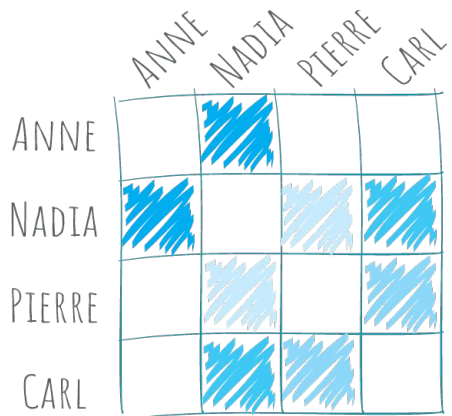
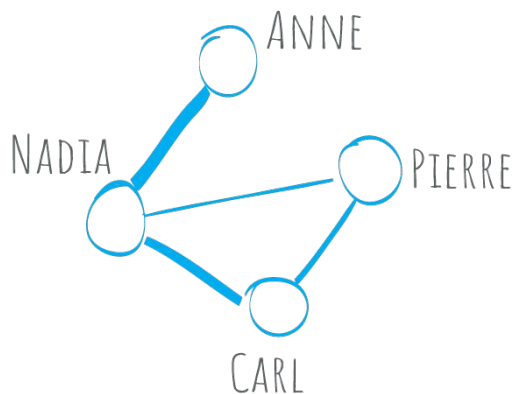


# Contracts have attributes

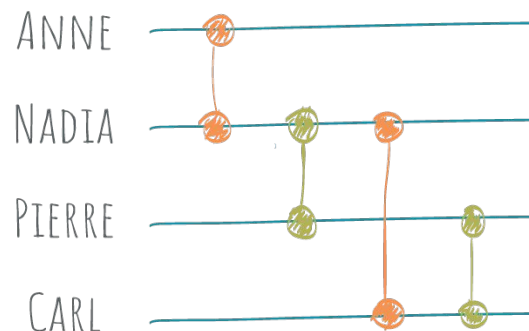


# Contracts: how to visualize contract's attributes?

- Edge attributes



payments

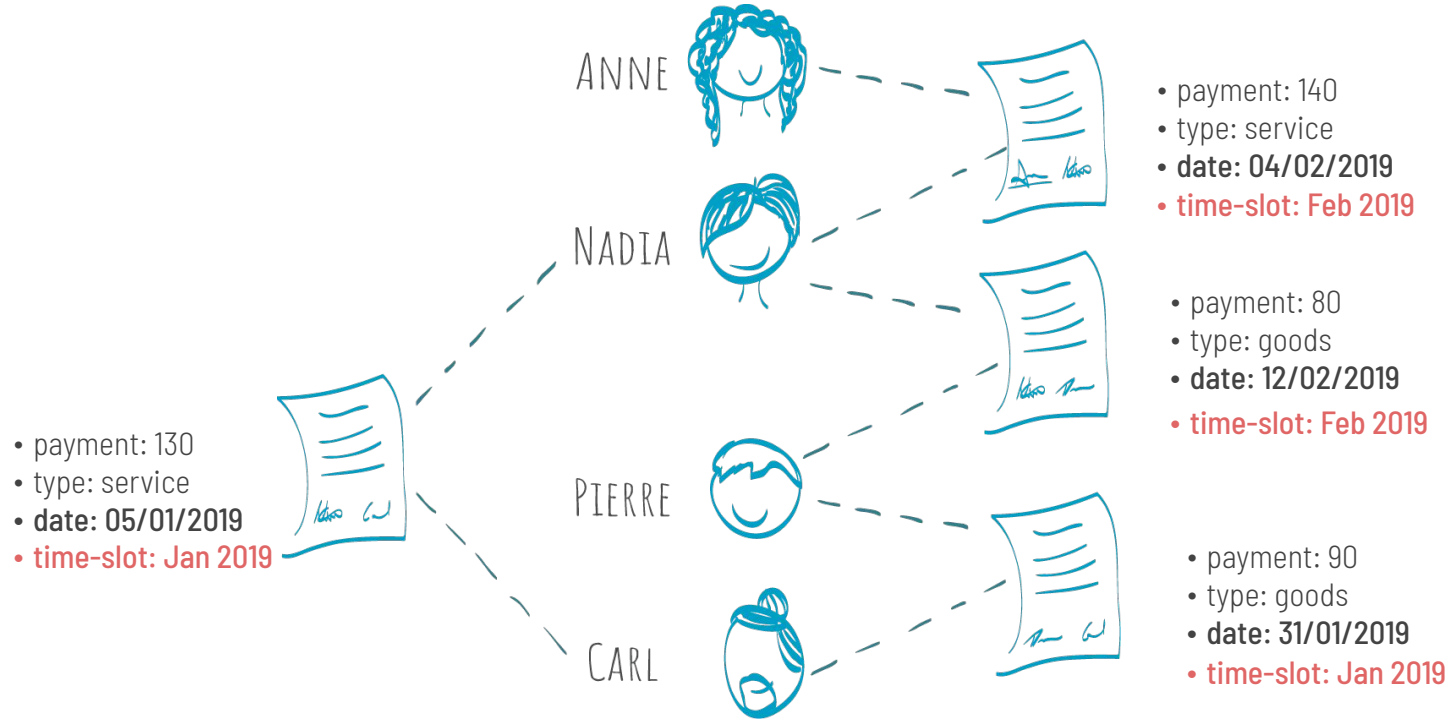


type

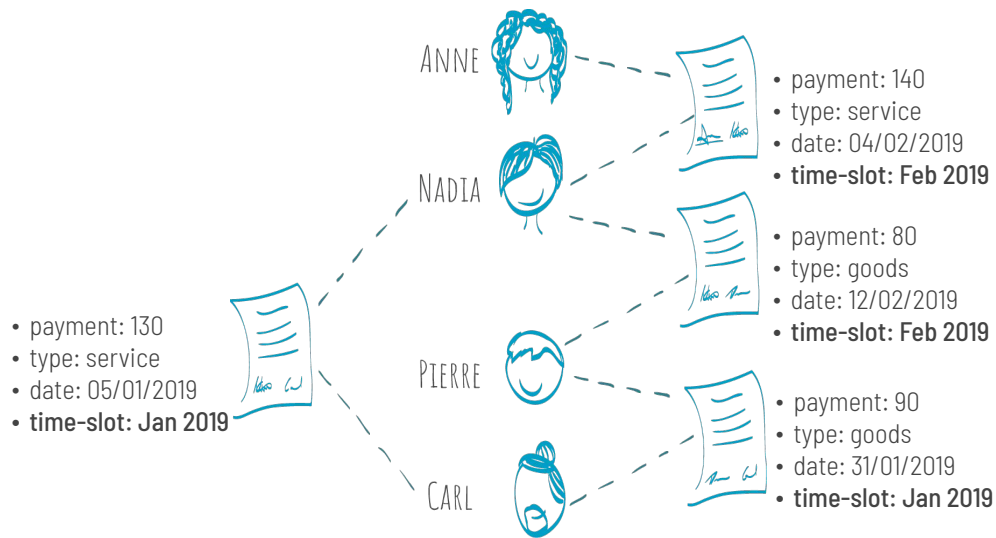
service  
goods

type

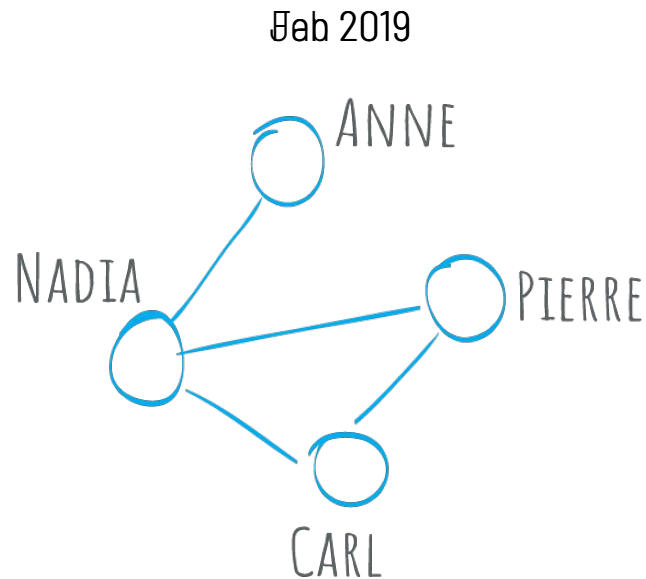
# Time can also be a contract attribute



# Map time to time

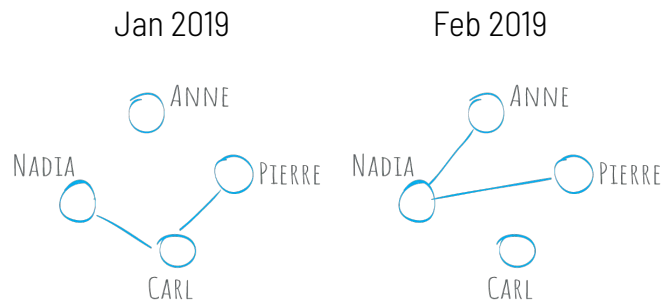


- Animation

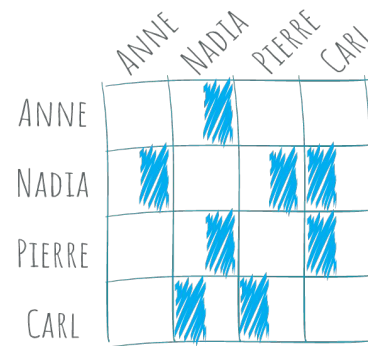
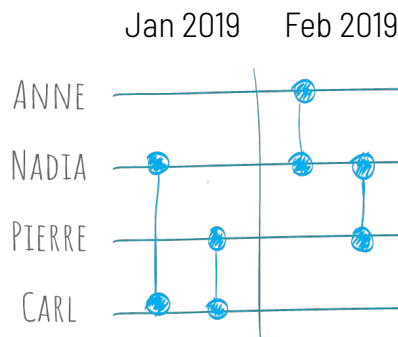


# Map time to space

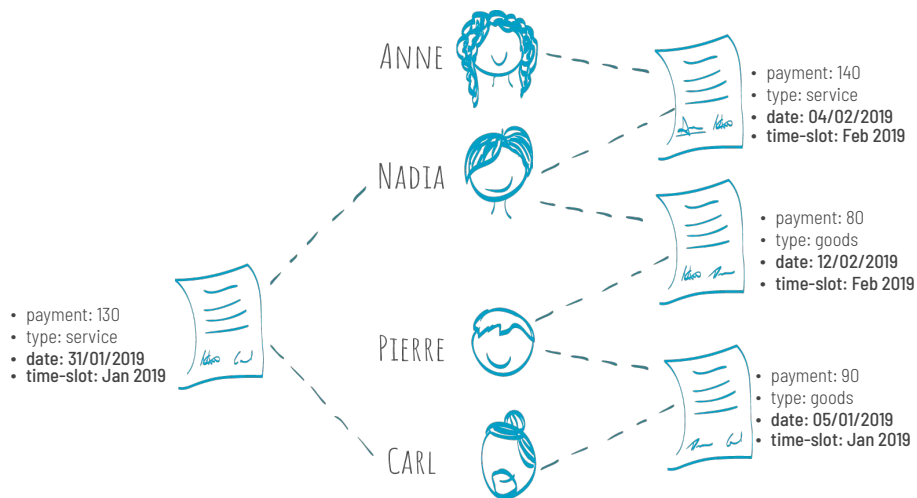
- Juxtaposed



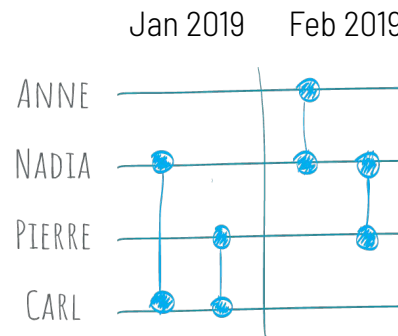
- Integrated



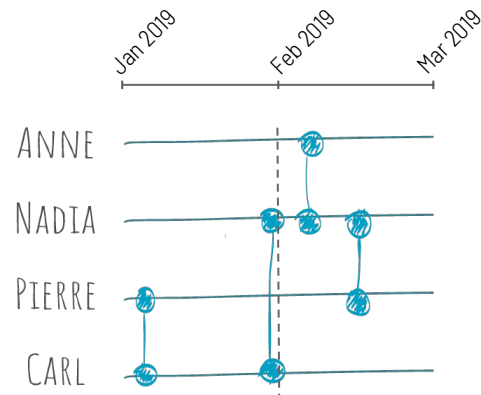
# How to handle time?



- multiple networks with time slots

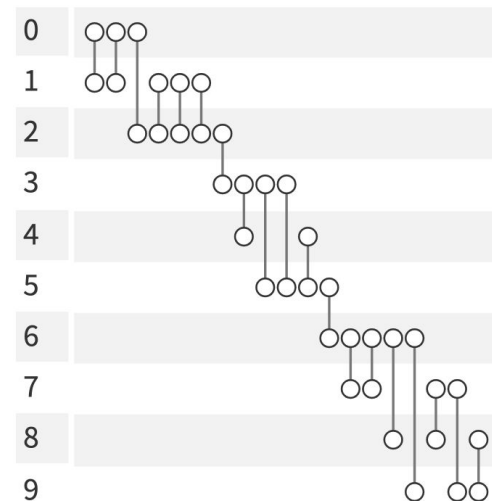
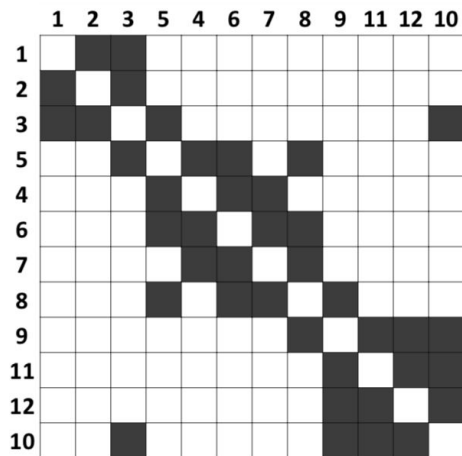
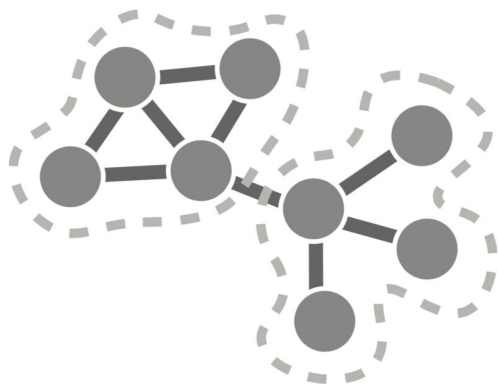


- continuous (link streams)



# How to represent groups? Nodes

- Position

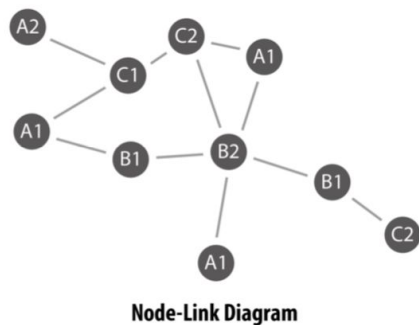


Nobre, C., et al. "The state of the art in visualizing multivariate networks." *Computer Graphics Forum*. Vol. 38. No. 3. 2019.

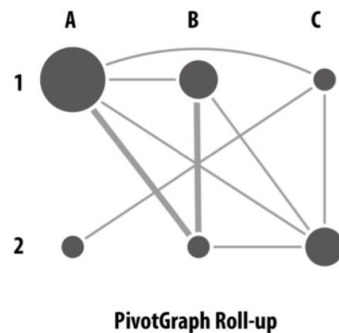
Vehlow, Corinna, Fabian Beck, and Daniel Weiskopf. "The State of the Art in Visualizing Group Structures in Graphs." *EuroVis (STARs)*. 2015.

# How to represent groups? Nodes

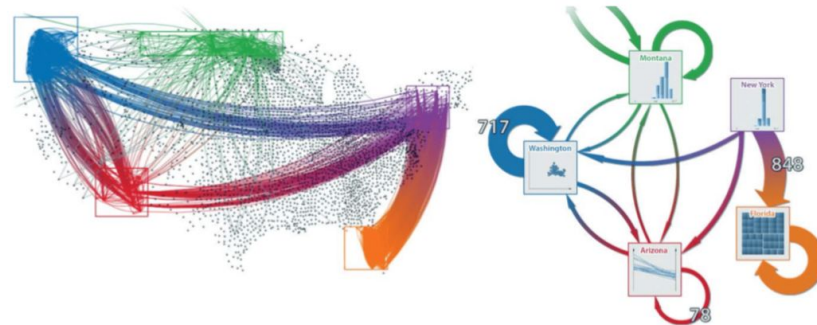
- Aggregation



(a)

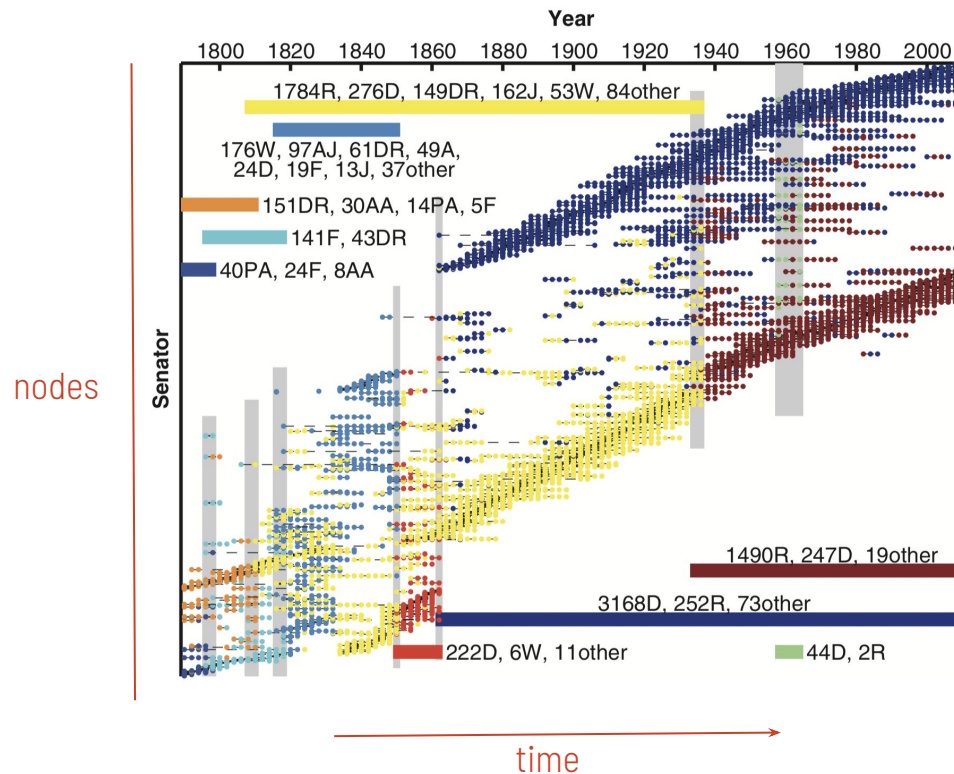


(b)



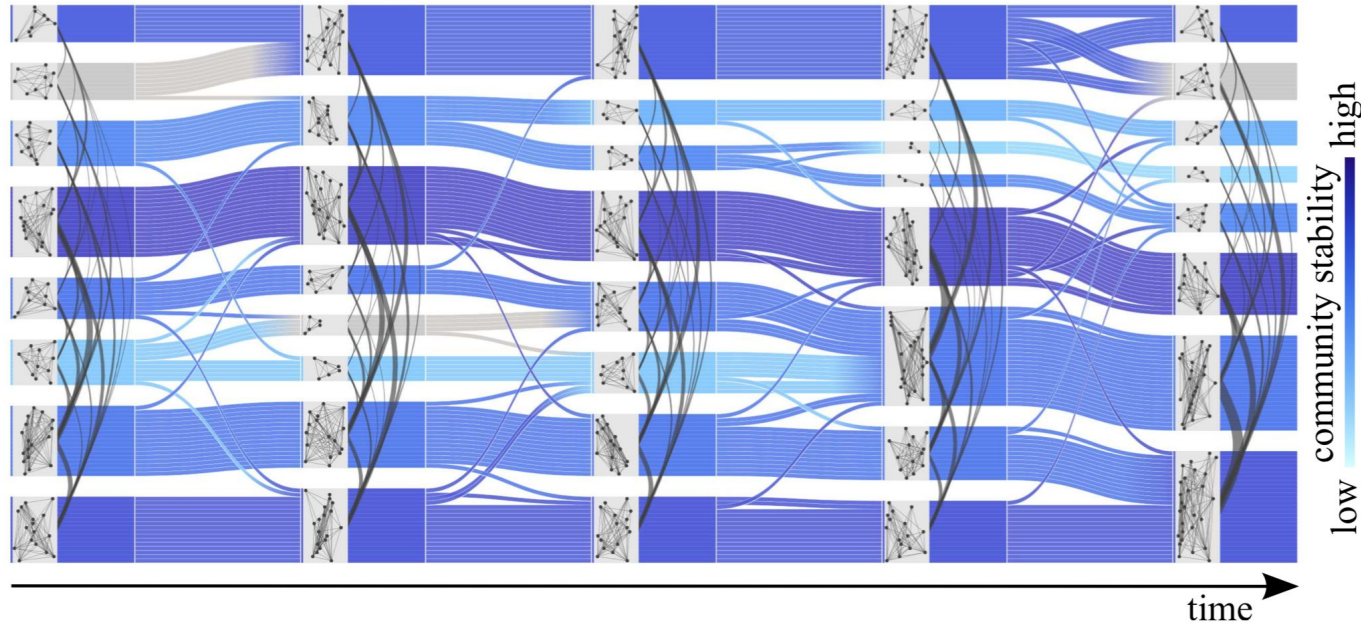


# How to represent dynamic groups?



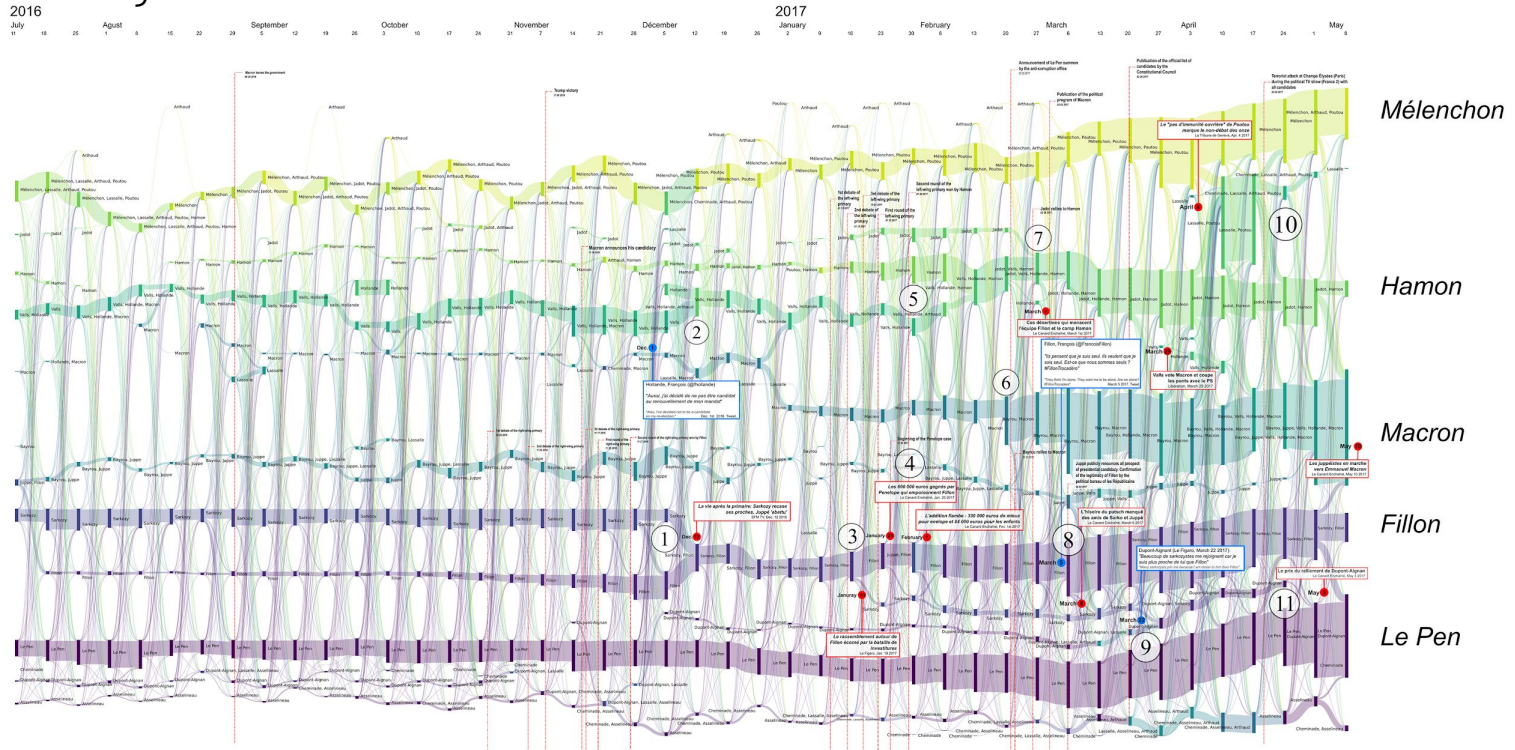
# How to represent dynamic groups?

- Alluvial diagrams



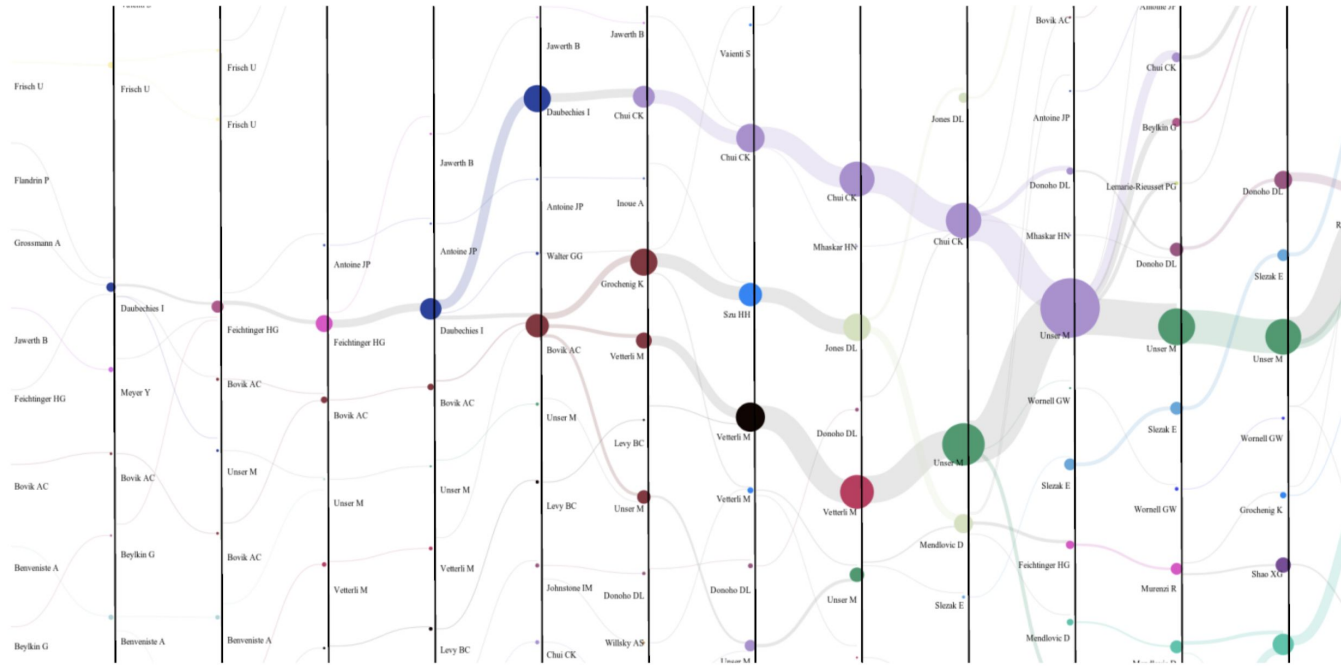
# How to represent dynamic groups?

- Alluvial diagrams



# How to represent dynamic groups?

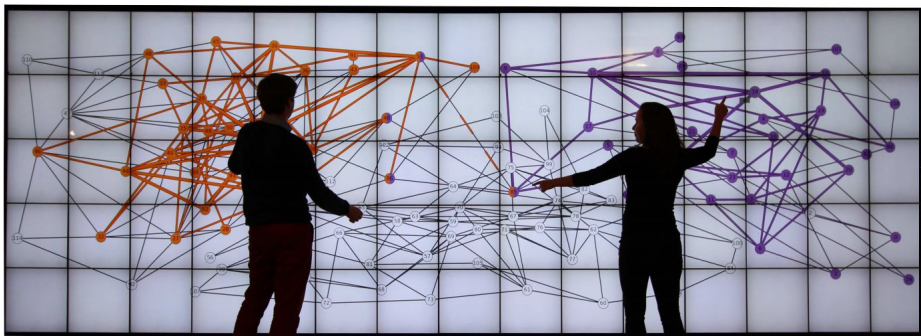
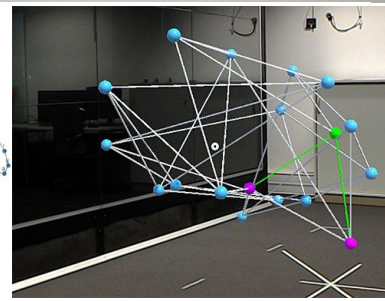
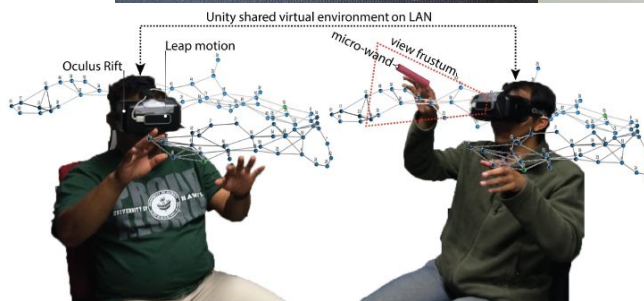
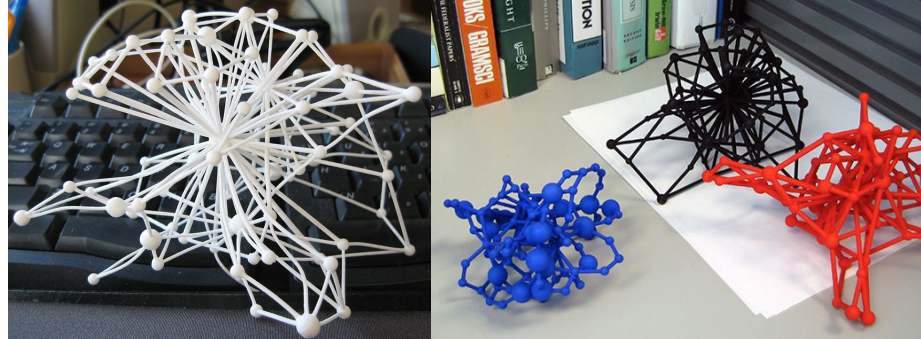
- Alluvial diagrams





# Beyond the Desktop

- Physical visualization of networks
  - <http://dataphys.org/list/tag/network/>
- Augmented Reality
  - E.g.  
<https://imld.de/en/research/research-projects/a-r-graph-vis/>
- Wall-Sized Display
  - E.g. Arnaud Prouzeau, Anastasia Bezerianos, Olivier Chapuis. Evaluating Multi-User Selection for Exploring Graph Topology on Wall-Displays.

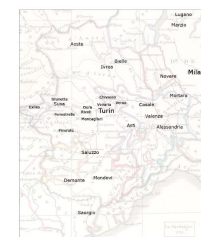
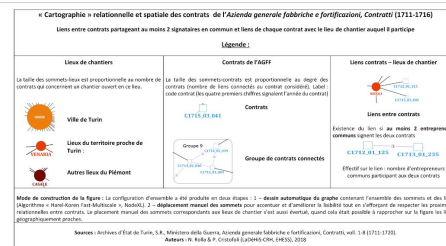
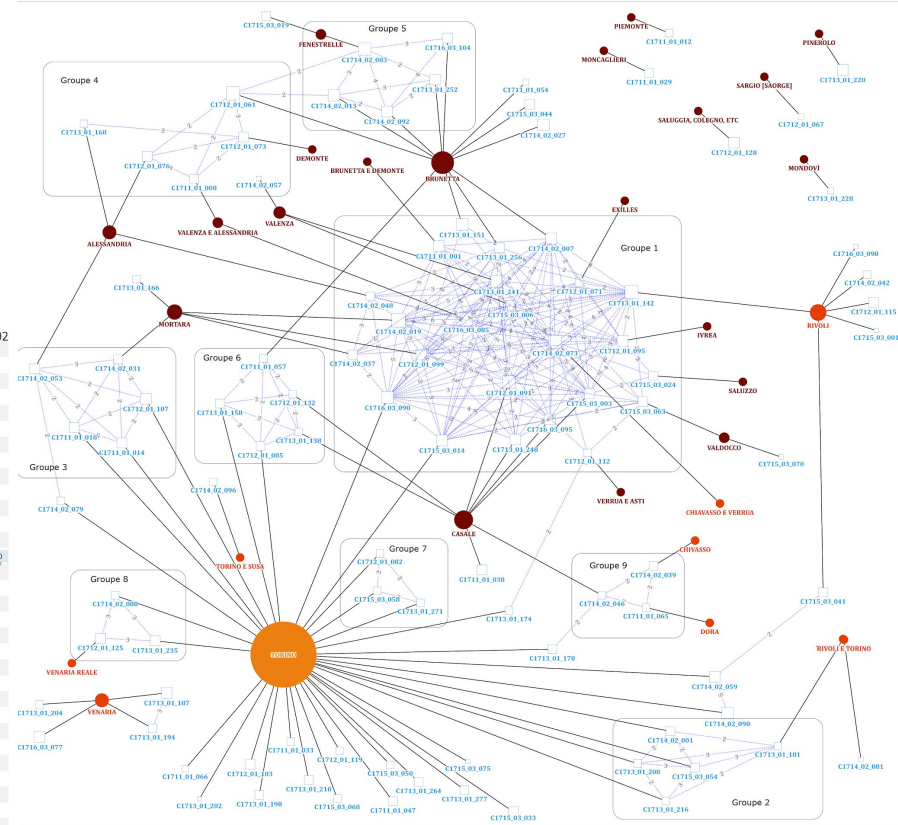
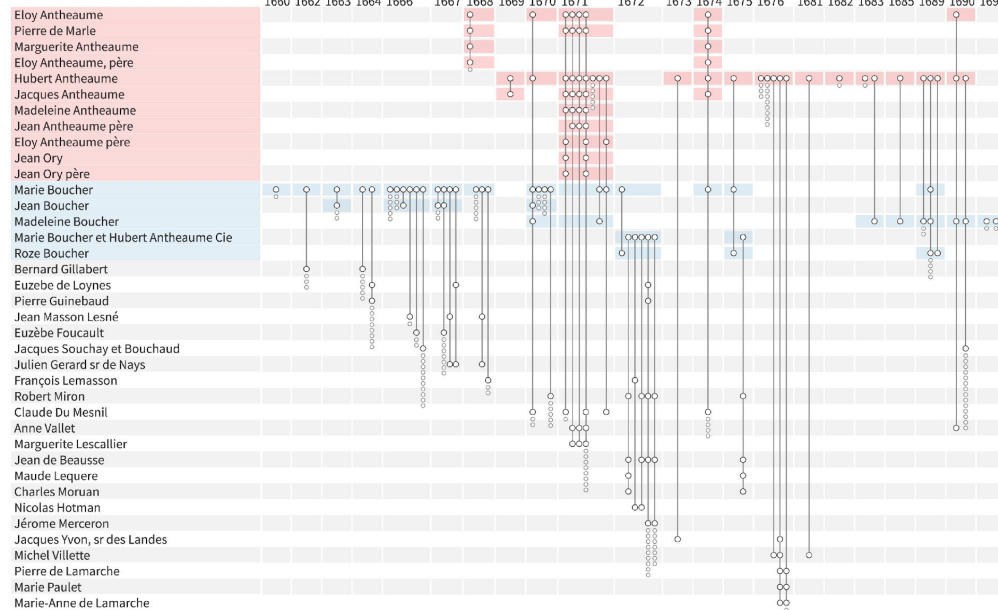


# Main questions today

1. What are the main questions about the data? **What would you like to know?**
2. When your dynamic network grows, how would you like to handle it to keep it under control? **What would you like to do?**
  - Topology/relations
  - Time
  - Attributes
  - How would you like to collaborate with algorithms? (**what would you like to compute?**)
3. We do visualization system, how would you like to have your work supported visually? **What would you like to see?**

# Two Examples

## Marie Boucher 3 periods



# References

## Visualization

- [1] Beck, Fabian, et al. "The State of the Art in Visualizing Dynamic Graphs." *EuroVis (STARs)*. 2014.
- [2] Nobre, C., et al. "The state of the art in visualizing multivariate networks." *Computer Graphics Forum*. Vol. 38. No. 3. 2019.
- [3] Vehlow, Corinna, Fabian Beck, and Daniel Weiskopf. "The State of the Art in Visualizing Group Structures in Graphs." *EuroVis (STARs)*. 2015.
- [4] Mcgee, Fintan, et al. "The State of the Art in Multilayer Network Visualization." *Computer Graphics Forum*. 2019.

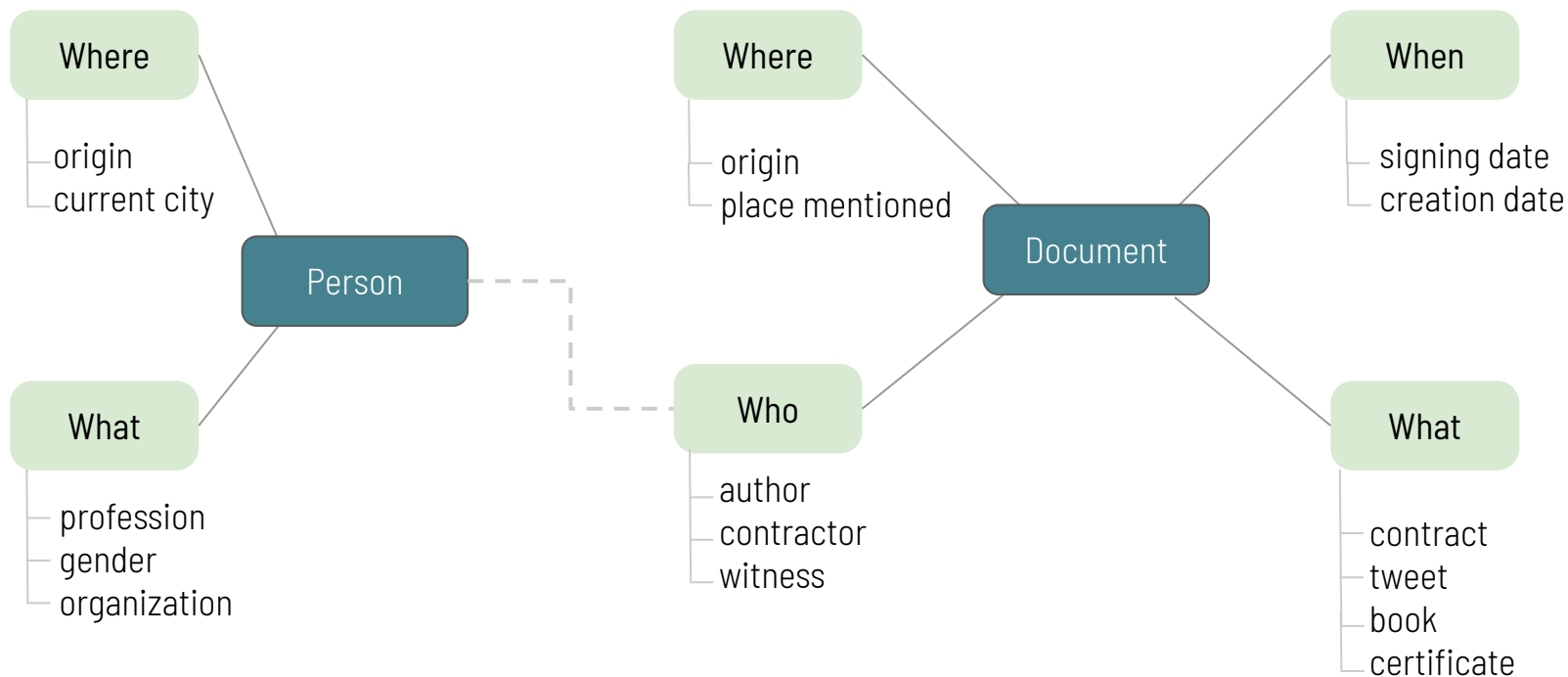
## Dynamic clustering methods and visualization

- [5] Rossetti, Giulio, and Rémy Cazabet. "Community discovery in dynamic networks: a survey." *ACM Computing Surveys (CSUR)* 51.2 (2018): 35.



# Wishful Thinking

# Data abstraction



# Wishful Thinking

- **Write** your individual answers on the sticky notes with the corresponding color (10 min)
- **Discuss** your answers in groups of 2 and write additional answers on sticky notes (15 min)
- **Share** your answers with the group
- **Rank** ideas

# Wishful Thinking

1. What would you like to know?

What are the main questions about the data?



2. What would you like to be able to do?

What would you like to compute?



# Lunch Break

Ideation

# Ideation

- **Brainstorm** about ideas in groups of 2-3 and record your ideas on sticky notes (25 min)

*Please form a group with people you usually don't work with*

- **Share** your answers with the group
- **Decide** on one idea for the next activity (storyboarding)

# Ideation

## 3. How would you be able to see that?

How would you like to have your work supported visually (through a visualization system)?





# Storyboarding

# Storyboarding

- Create a storyboard:

**“How could a visualization system based on the data look like  
and  
how would you interact with it?”**

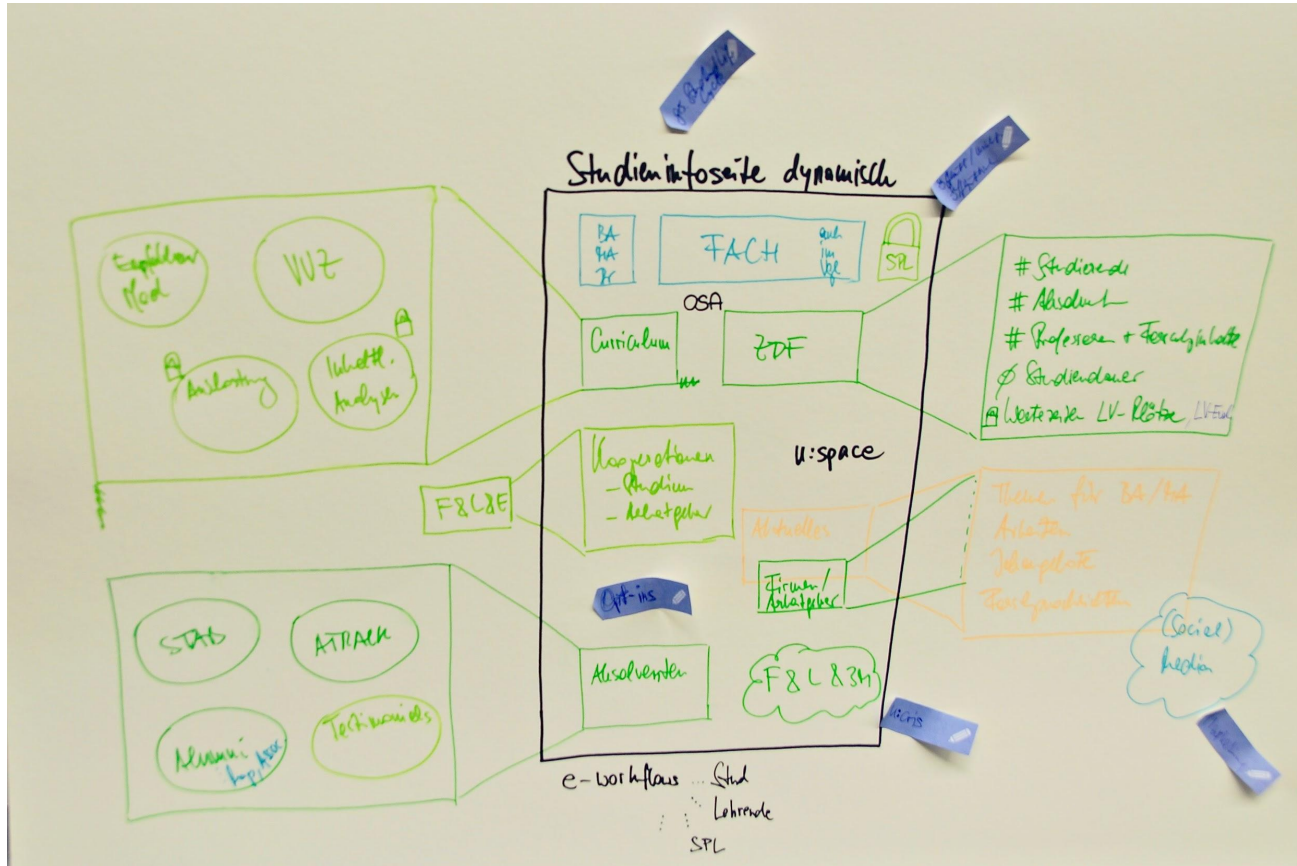
- Storyboarding is about sketching your ideas (not pretty pictures)
- Bring your ideas to paper and communicate it

# Storyboarding

**„How could a visualization system based on the data look like  
and  
how would you interact with it?“**

- Create a storyboard in your group (1 h 15 min)
  - Be creative and think out of the box
  - Bring your ideas to paper
  - Use as many materials as you want
  - Record (short) videos of your prototype and explain how you would interact with it (Video Prototyping)
- Present your video to all participants and discuss it (20 min per group)

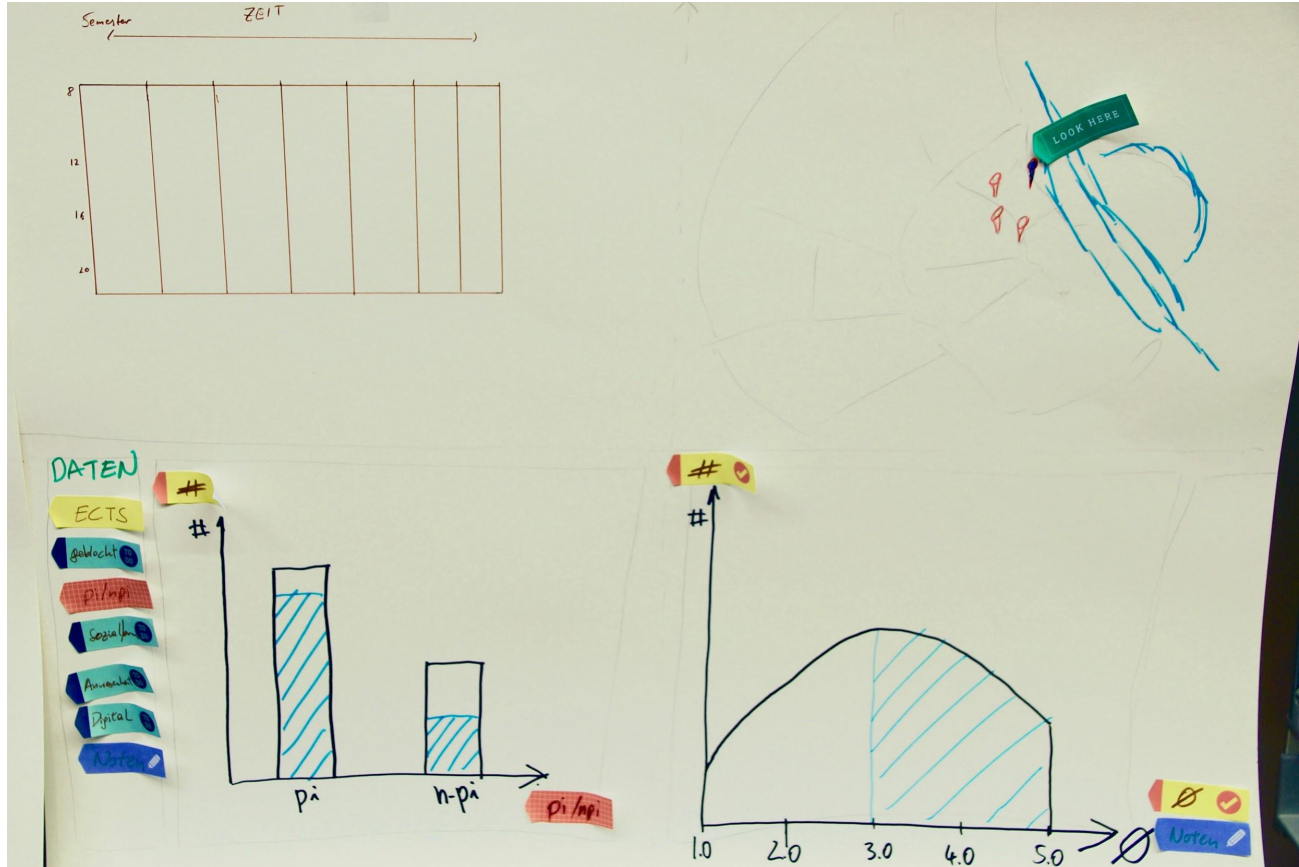
# Example



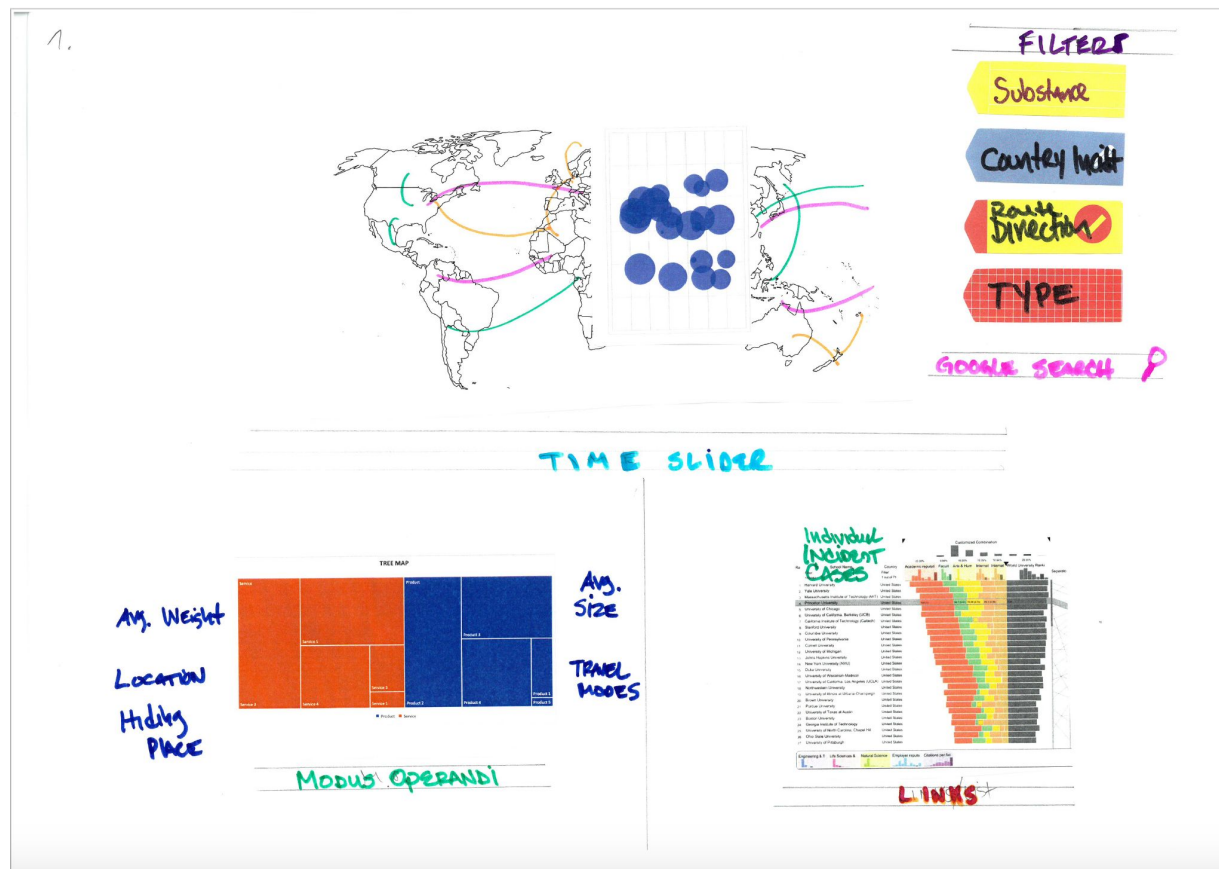
# Example



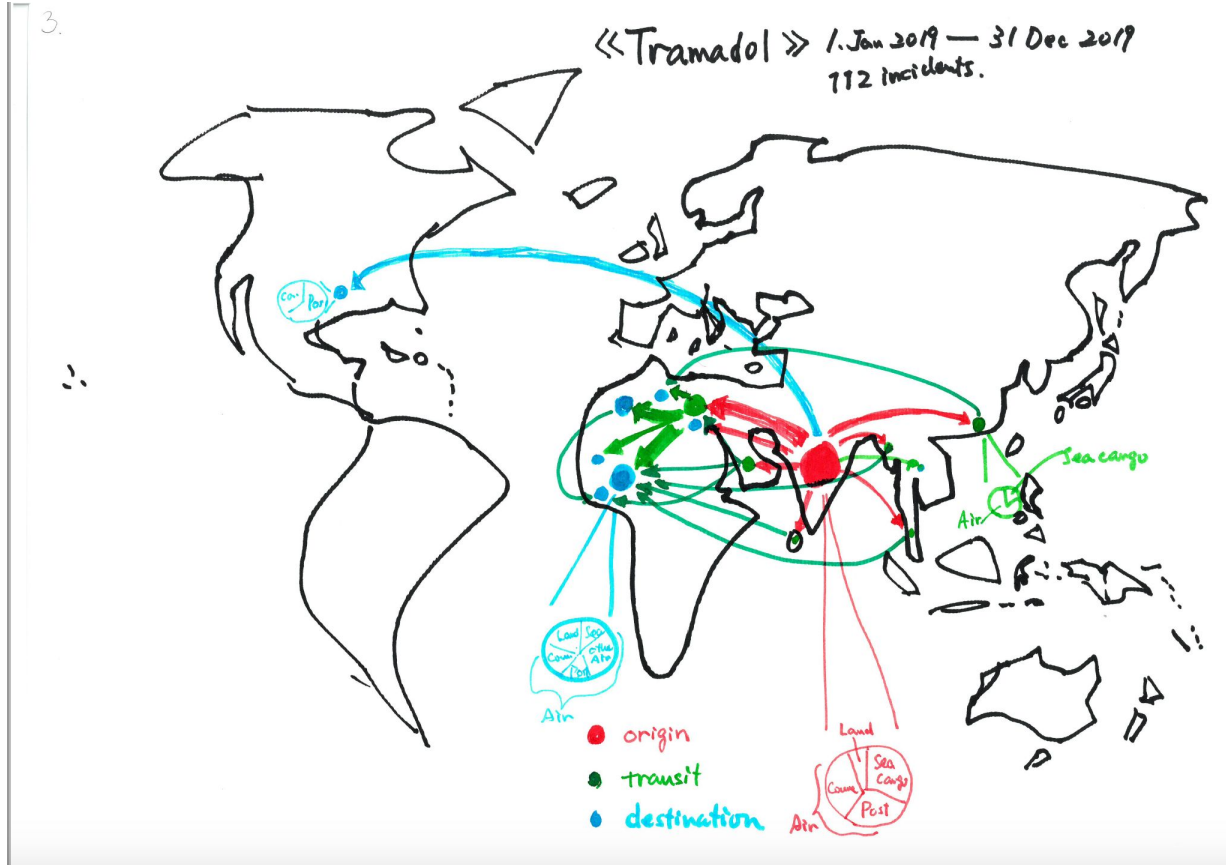
# Example



# Example

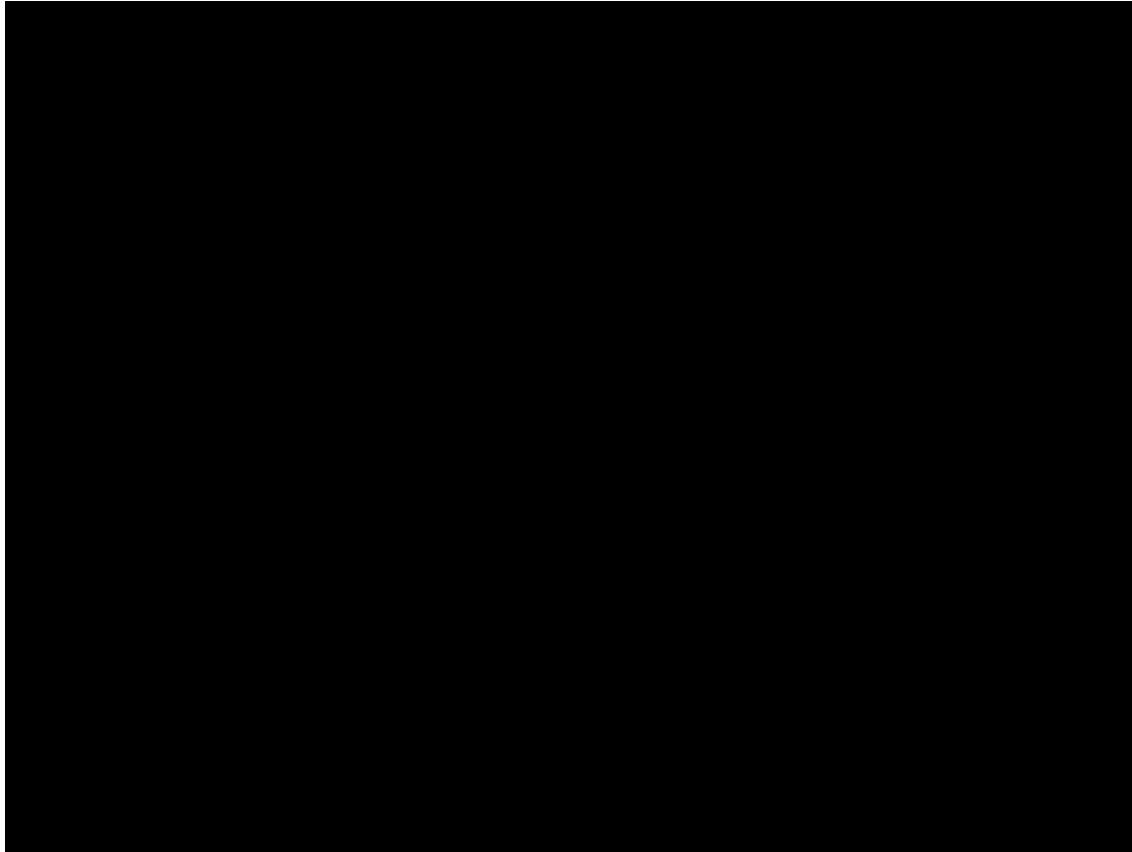


# Example





# Example



# Conclusion

Thank you for participating!