

Representing historical complexity in networks

Marten Düring

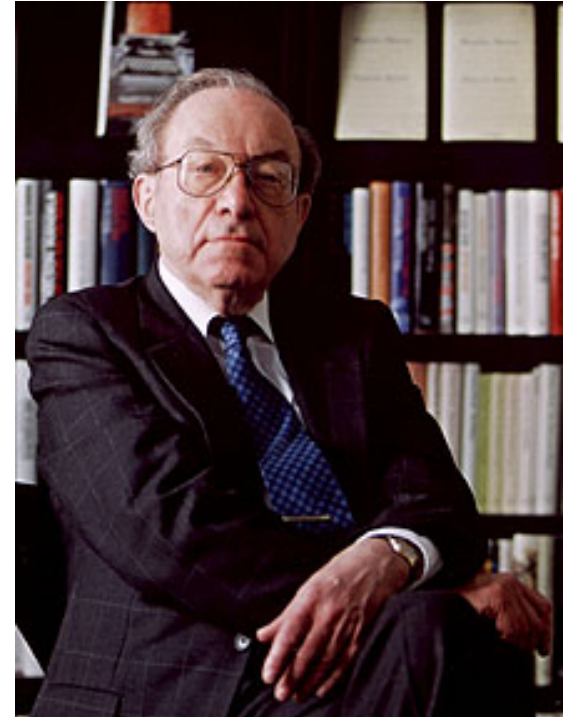
Luxembourg Centre for Contemporary and Digital History



The essence of historical work:

The coupling of heterogeneous sources and artefacts facilitates the „Creation of a form in which one source sheds light on another“

Raul Hilberg

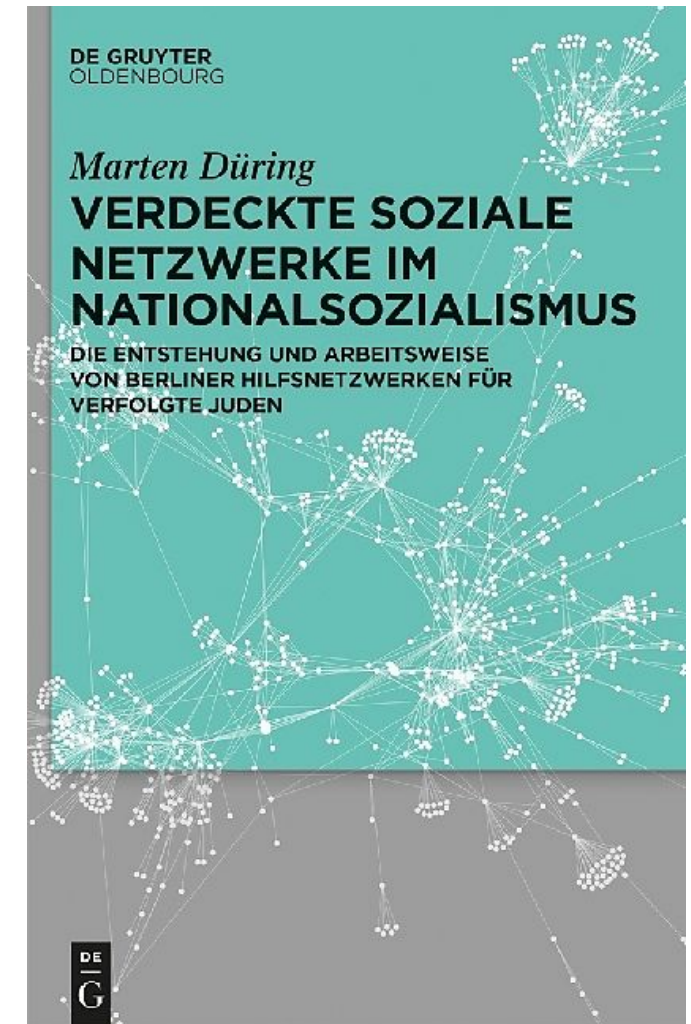


Case study: Covert support networks in Berlin 1937 – 1945

Verdeckte Soziale Netzwerke Im Nationalsozialismus. Berliner Hilfsnetzwerke Für Verfolgte Juden. Berlin: De Gruyter, 2015.

“The Dynamics of Helping Behavior for Jewish Refugees during the Second World War: The Importance of Brokerage.” *Online Encyclopedia of Mass Violence*, 2016.

<http://www.sciencespo.fr/mass-violence-war-massacre-resistance/en/document/dynamics-helping-behaviour-jewish-fugitives-during-second-world-war-importance-brokerage-se>.



Covert networks: Historical context

1. Destruction of any organized opposition by mid 1930s, arrests of leaders
2. Systematic social isolation of Jews
3. Destruction of social ties among Jews: emigration, deportation and forced labor
4. High degree of control: social interactions, everyday commodities
5. Berlin: ca. 7.000 went into hiding, ca. 1/3 survived

How can support networks emerge / fugitives find help in this extremely hostile environment? (And why would anybody get involved in this?)

Method

- 4 support networks, 2 survivor networks in Berlin
- Manually encoded 5000 acts of help, 1400 individuals
- Relations: Form of help, intensity, duration, first meeting, time of help, NS “race status”, who helps whom

(1) Trust in isolated milieus

Whom can you trust?

For non-persecuted helpers:

1. Isolated “puddles”
2. Long-standing trusted ties
3. Charismatic “change agents”
4. Practice: Opportunities, obligations and requests to help peers; learning; escalation in persecution measures.



Franz Kaufmann



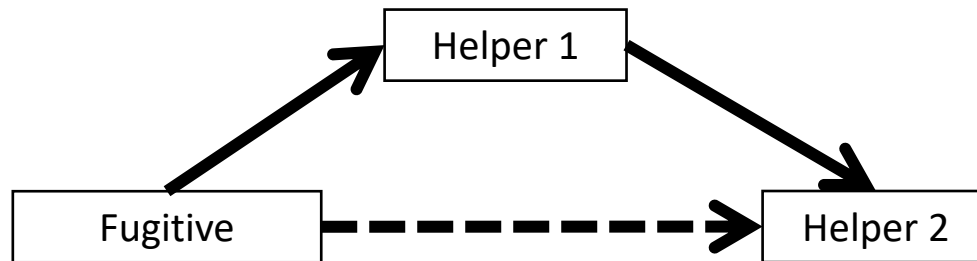
St. Annen church in Berlin Dahlem

(2) Trust along brokerage chains

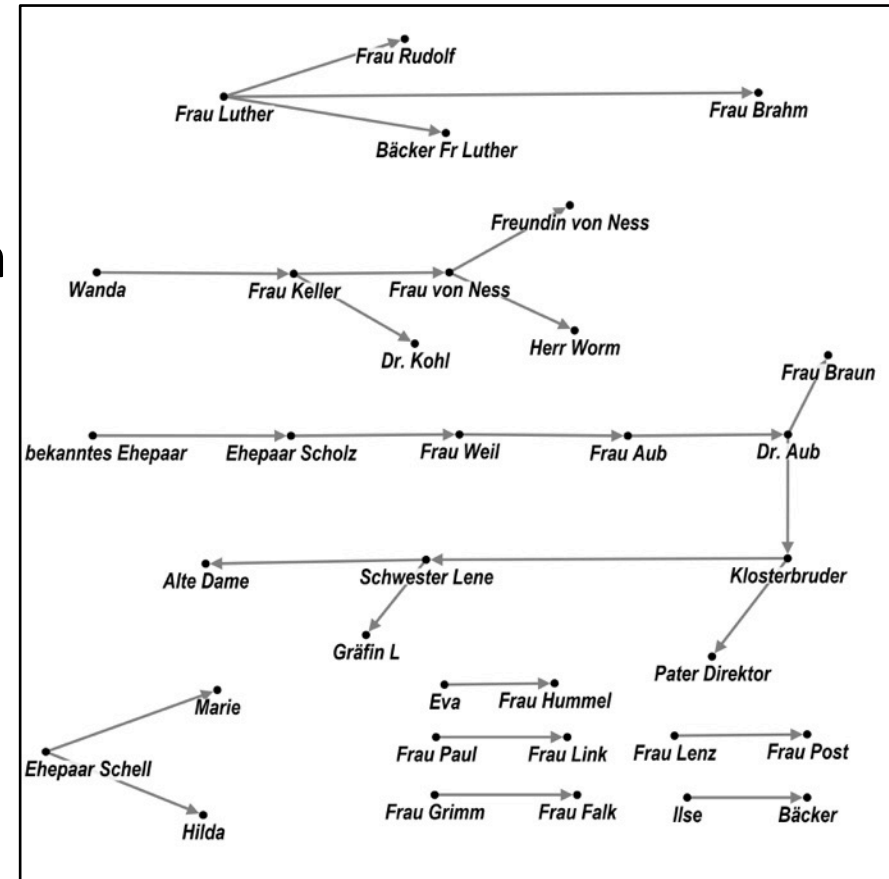
How do you find 79 new helpers?

Trust creation from a fugitive perspective:

1. Pre-existing relations
2. Joint experience of persecution
3. Brokerage



Brokerage chains for the Segal family



(3) Trust through reputation

Brokerage chains lead to:

1. Effective resource exchange
2. Uncontrollable growth
3. Increasing risk of discovery



Franz Kaufmann („Perle“)

From the Gestapo interrogation transcript:

„The more I gave in to the pity I felt, the greater were the requests I received which explains the scale of my wrong-doings.“

(...)

„Thereby I became, without wanting to, a point of attraction and collection for Jewish refugees.“

Is there any reason to use metrics on this kind of data?

Düring, Marten. “How Reliable Are Centrality Measures for Data Collected from Fragmentary and Heterogeneous Historical Sources? A Case Study.” In *The Connected Past. Challenges to Network Studies in Archaeology and History*, edited by Tom Brughmans, Anna Collar, and Fiona Coward, 85–102. Oxford: Oxford Publishing, 2016

	Vertex	Degree	In
2			
3	Lotte Kahle	34	
4	Luise Meier	27	
5	Herbert Strauss	25	
6	Josef Höfler	23	
7	Wilhelm Ritz	13	
8	Hugo Wetzstein	11	
9	Willy Vorwalder	9	
10	Hans Wollheim	8	
11	August Sapandowski	8	
12	Nathan Wolf	7	

Software:
NodeXL

Case study
(n sign.
Actors)
total #
actors

„Significance“ vs. scores

Historian vs. Centrality	Degree	In-degree	Out-Degree	Between- ness	Eigenvektor	Page rank	Closeness
Meier (10) 99 actors	5/10	5/10	5/10	5/10	6/10	5/10	6/10
Segal (11) 123 actors	5/11	4/11	5/11	4/11	6/11	4/11	6/11
Schönhaus (11) 76 actors	10/11	8/11	9/11	8/11	5/11	10/11	9/11
Kaufmann (19) 408 actors	7/19	5/19	11/19	7/19	5/19	10/19	6/19
Onkel Emil (11) 98 actors	8/11			8/11	10/11	8/11	3/11
Deibel (12) 188 actors	5/12			3/12	5/12	5/12	5/12
GdW (34) 368 actors	13/34	11/34	8/34	14/34	7/34	10/34	4/34
	1	0	1	0	1	1	1

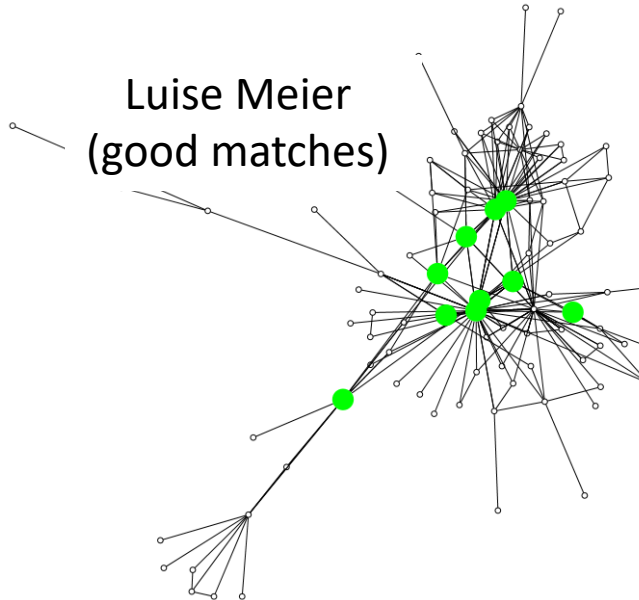
n sign.
Actors /
total n sign.
actors

„Significance“ within the Top 25

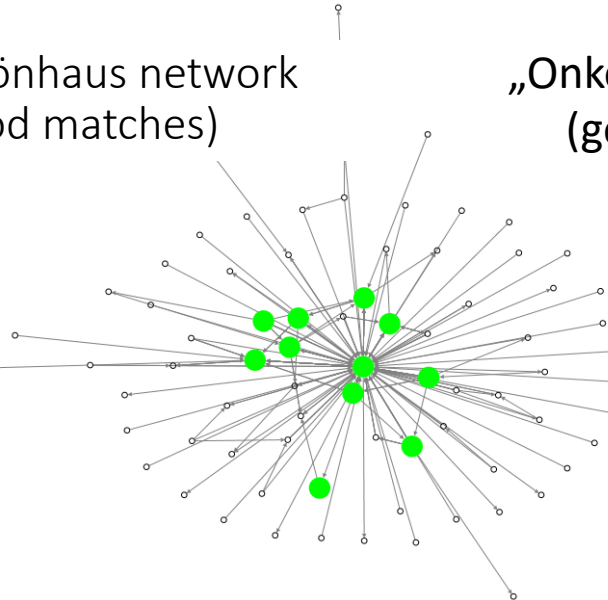
Historian vs. Centrality	Degree	In-degree	Out-Degree	Between- ness	Eigenvektor	Page rank	Closeness
Meier (10) 99 actors	10/10	8/10	10/10	9/10	6/10	10/10	8/10
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Schönhaus (11) 76 actors	10/11	9/11	10/11	10/11	10/11	10/11	10/11
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Onkel Emil (11) 98 actors	10/11	9/11	10/11	10/11	10/11	10/11	10/11
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GdW (34) 368 actors	8/34	10/34	6/34	11/34	3/34	1/34	4/34
	4	3	4	3	3	4	4



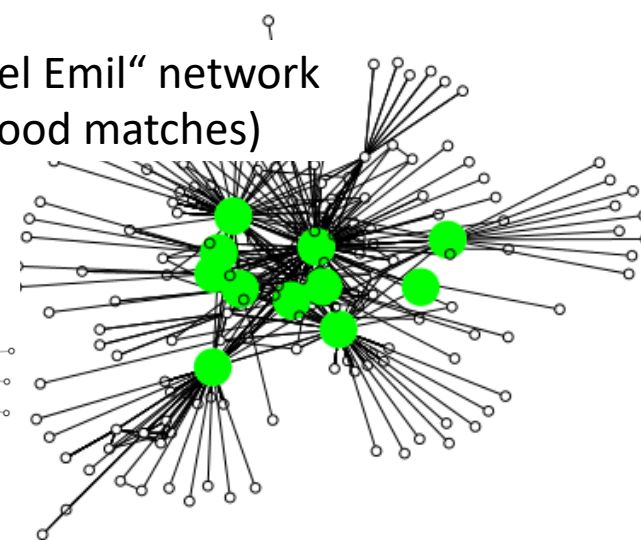
Luise Meier
(good matches)



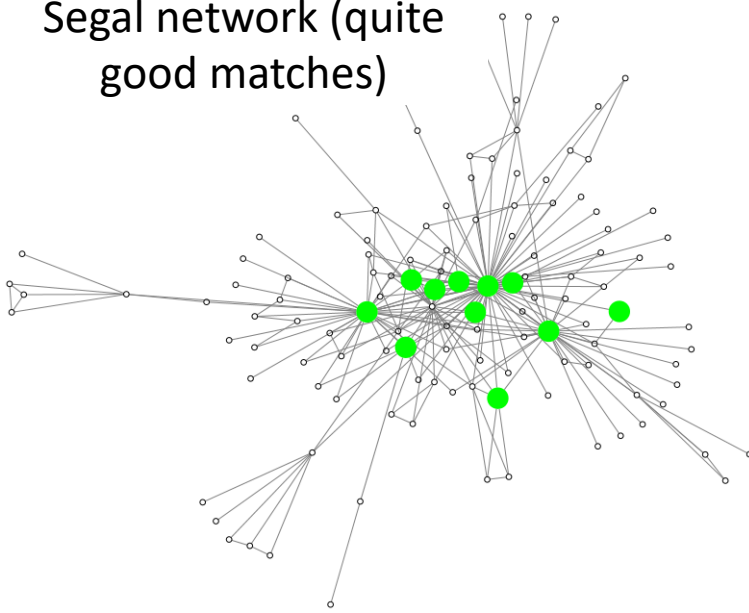
Schönhaus network
(good matches)



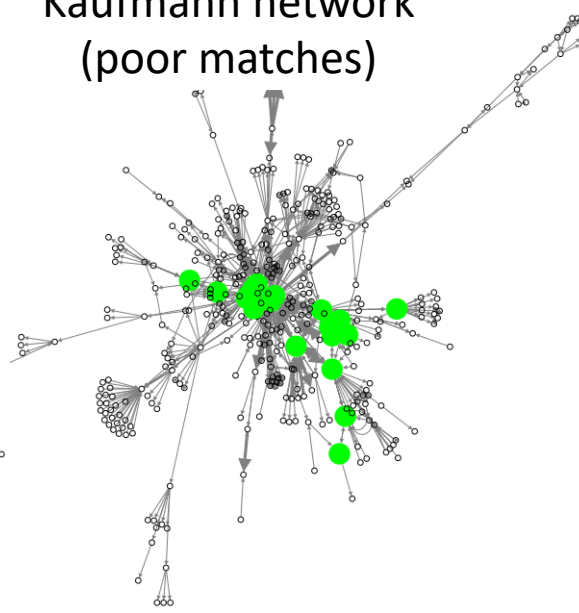
„Onkel Emil“ network
(good matches)



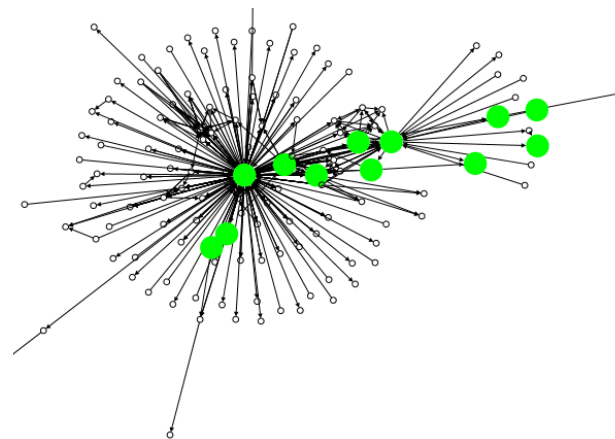
Segal network (quite
good matches)

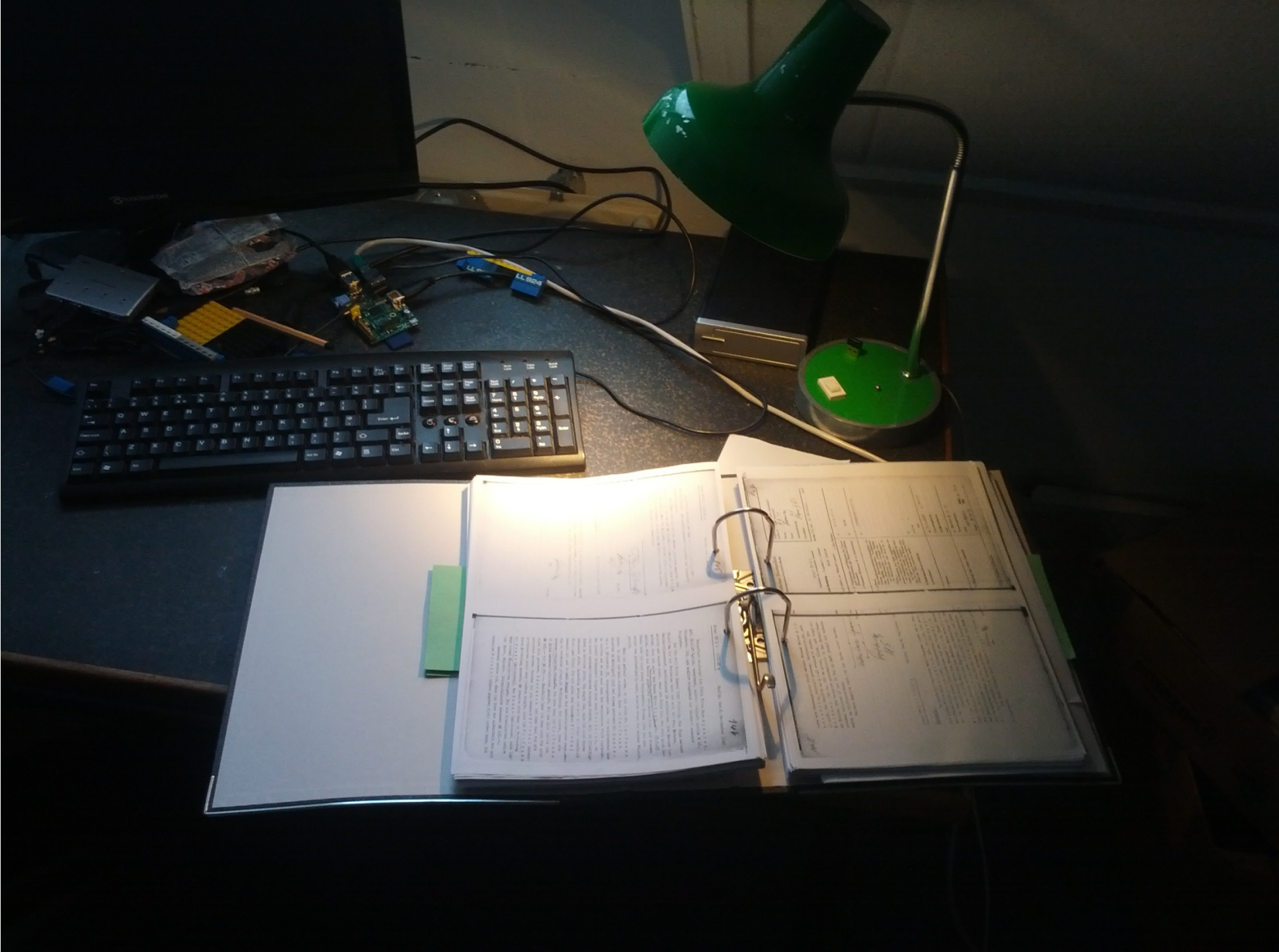


Kaufmann network
(poor matches)



Deibel network (poor
matches)





Overview of current practices and challenges

Social ties and history

- Network-like metaphors (web, strings, tied up...)
- « Structure »
- Prosopographies
- Group biographies
- Kinship, Genealogy
- Economic and academic exchange
- ...

What makes historical networks different?

“History”

and

“The Social Sciences”

Understanding the particular
in its complexity

<->

Discovery of rec Patterns

What do historians do with networks?

1. Buzz-word (search H-Net etc.)
2. Networks as metaphor/research object (?)
3. Self-perception of historical persons (doh)
4. Adoption of SNA concepts and integration in historical narratives
(W. Reinhardt, I. Malkin, G. Ruffini)
5. Adoption of SNA methods and integration in historical narratives
(M. Stark, C. Lemerrier, C. Verbruggen, M. Bixler, R&S Ahnert, M. Grandjean...)
6. Appropriation of methods for source criticism and reconstruction of historical scopes of knowledge (L.v. Keyserlingk, U. Eumann)
7. Graph-based, interactive visualisations of historical data (A. Liu, C. Warren)
8. Datavis including network vis (Image search "DH visualization")

These and a lot more references here: <http://historicalnetworkresearch.org/bibliography/>

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These and a lot more references here: <http://historicalnetworkresearch.org/bibliography/>

Gießmann: Die Verbundenheit der Dinge

Oldest references are to spider webs, fishing nets and textiles.

How were hunting utensils transformed into cultural practices?

“Networks are understood as relevant, heterogeneous, [ambivalent MD], interconnecting and vague quasi-objects, which integrate humans, objects, signs, institutions and spaces” p.15



Historical Network Research

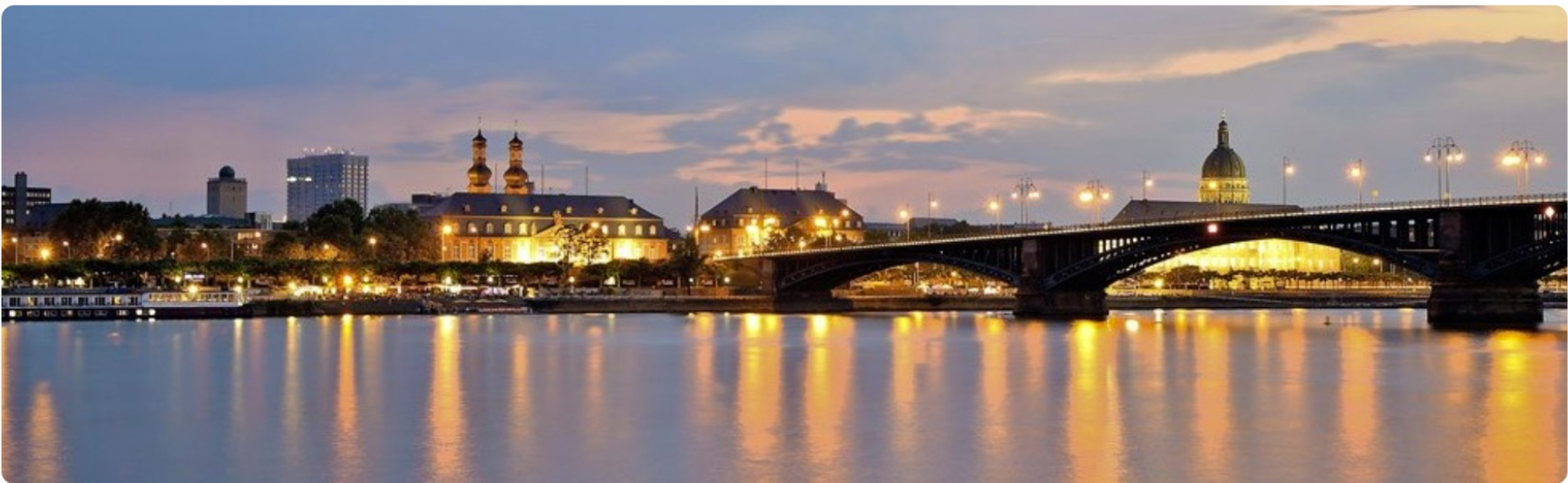
Network analysis in the historical disciplines

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Réseaux et Histoire
Connected Past
Topographies of Entanglements

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959 “items”



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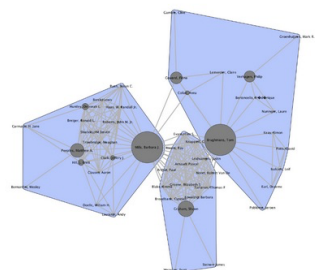
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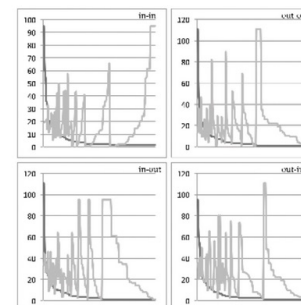
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Trends in Archaeological Network Research: A Bibliometric Analysis

Tom Brughmans, Matt Peeples

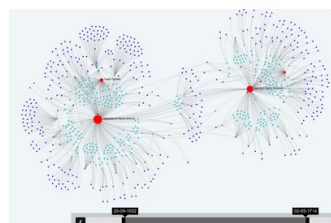
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Networks of Conflict: Analyzing the "Culture of Controversy" of Polemical Pamphlets of Intra-Protestant Disputes (1548-1580)

Aline Deicke

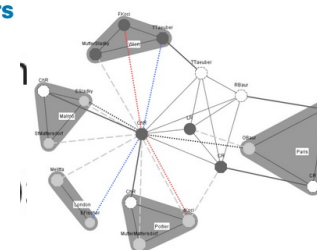
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71-105



Using Multi-Layered Networks to Disclose Books in the Republic of Letters

Ingeborg van Vugt

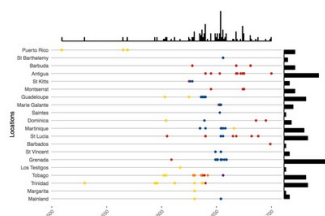
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Ruedi Eppe

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106-145



Hypergraph Representations: A Study of Carib Attacks on Colonial Forces, 1509-1700

Termeh Shafie, David Schoch, Jimmy Mans, Corinne Hofman, Ulrik Brandes

[PDF](#)

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Journal ISSN: 2535-8863

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<http://jhnr.uni.lu/>

Networks of Conflict: Analyzing the "Culture of Controversy" of Polemical Pamphlets of Intra-Protestant Disputes (1548-1580)

What do letter exchanges tell us about the nature of Conflicts?

Who has a conflict with whom?

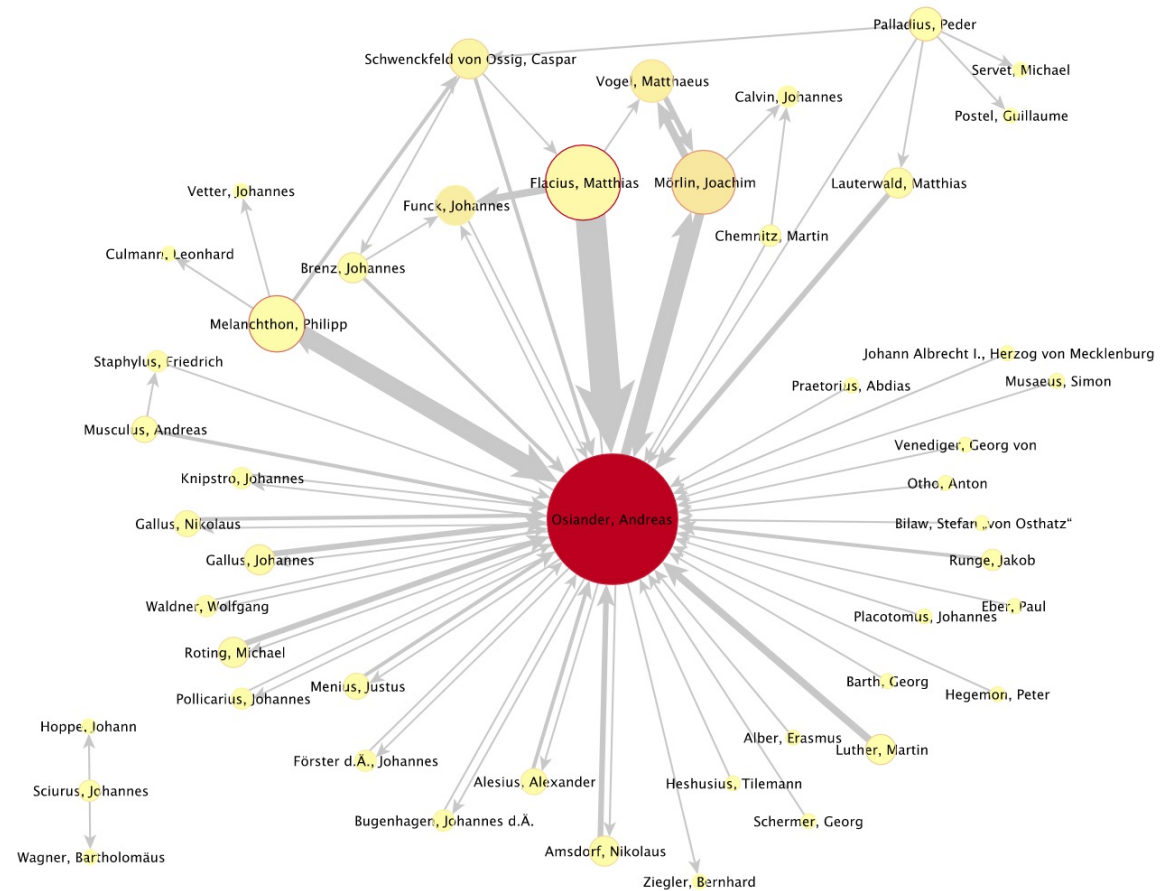
Who is at the centre?

Who is worthy of response from whom?

Identify clusters of conflicts.

Deicke, A. (2017). Networks of Conflict: Analyzing the "Culture of Controversy" of Polemical Pamphlets of Intra-Protestant Disputes (1548-1580). *Journal of Historical Network Research*, 1(1), 71-105.

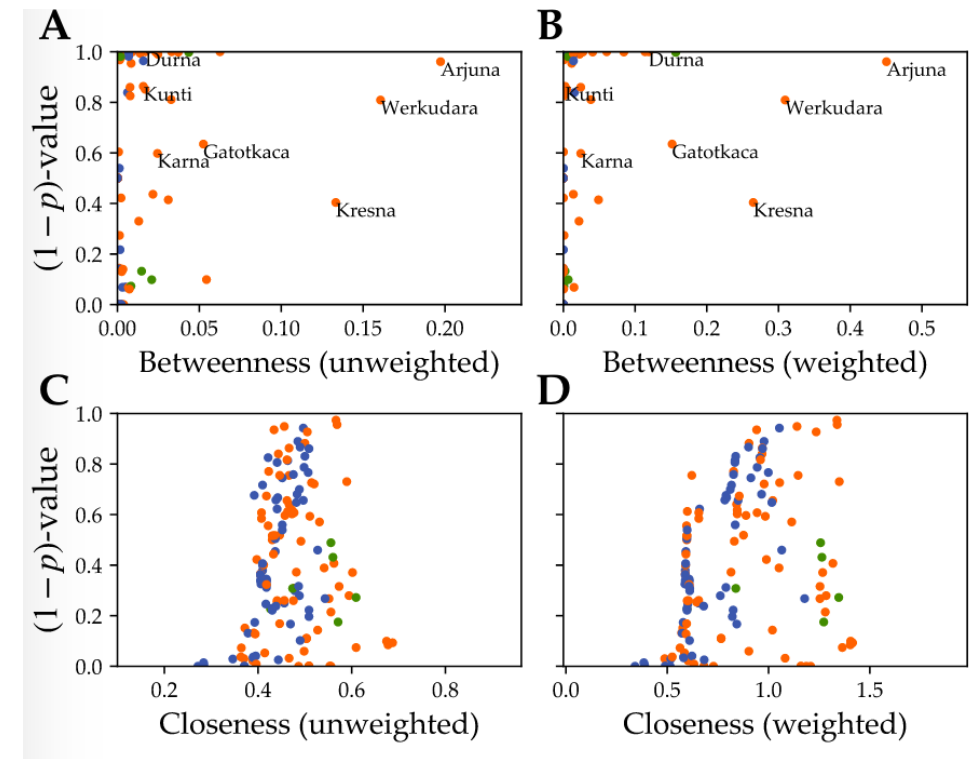
<https://doi.org/10.25517/jhnr.v1i1.8>



Searching for hidden bridges in co-occurrence networks from Javanese wayang kulit

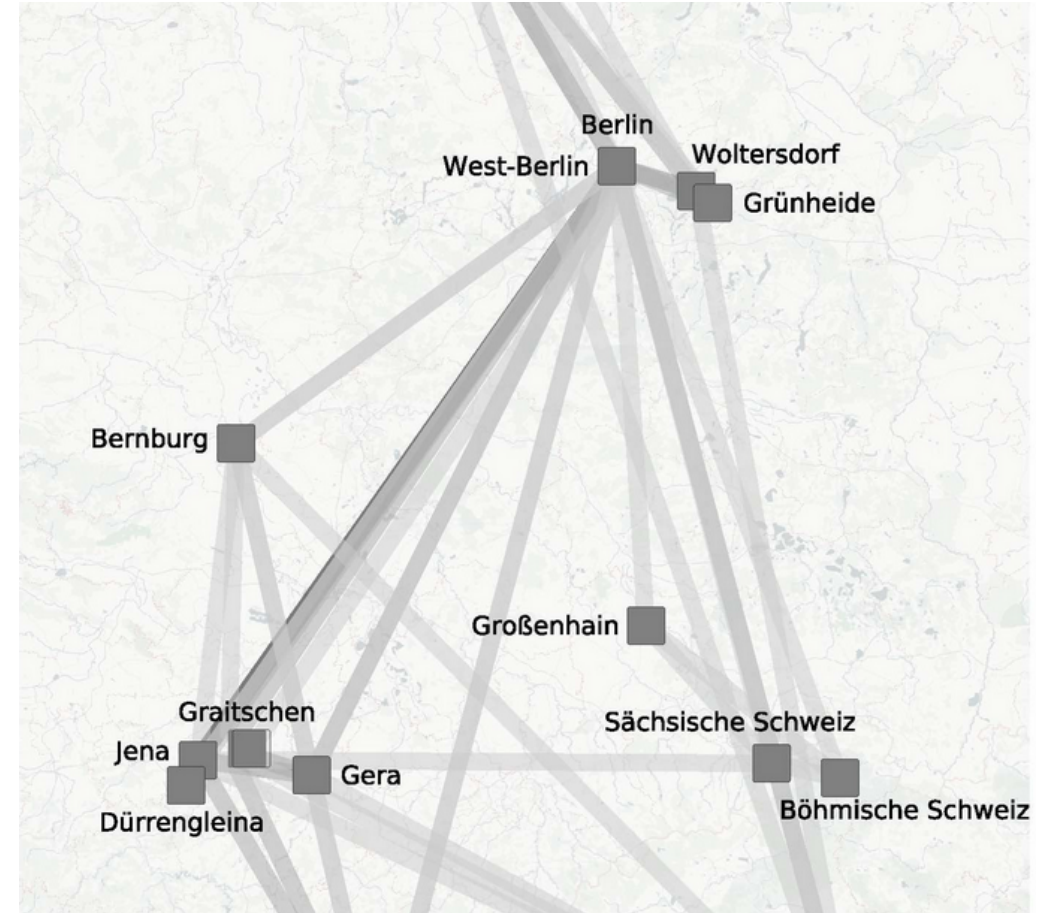
Which fictional characters
in Indonesian theatre plays
act as bridges across communities?

Schauf, A., & Escobar Varela, M. (2018). Searching for hidden bridges in co-occurrence networks from Javanese wayang kulit. *Journal of Historical Network Research*, 2(1), 26-52.
<https://doi.org/10.25517/jhnr.v2i1.42>



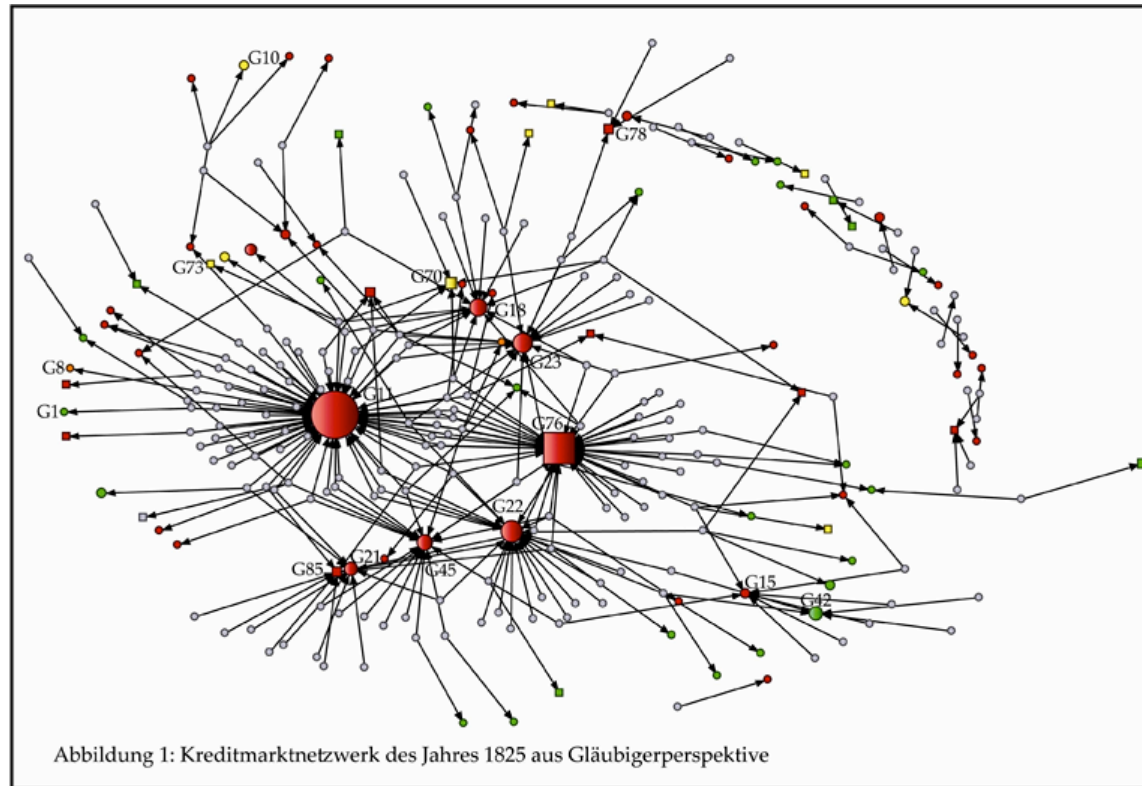
Geospatial Social Networks of East German Opposition (1975-1989/90)

“exploring major changes in the social network structures could help us to identify turning points thus far lacking a plausible explanation or having escaped scholars attention.”



Elo, K. (2018). Geospatial Social Networks of East German Opposition (1975-1989/90). *Journal of Historical Network Research*, 2(1), 143-165. <https://doi.org/10.25517/jhnr.v2i1.45>

Martin Stark, How has a reform affected social embeddedness in a rural 19th century credit market?

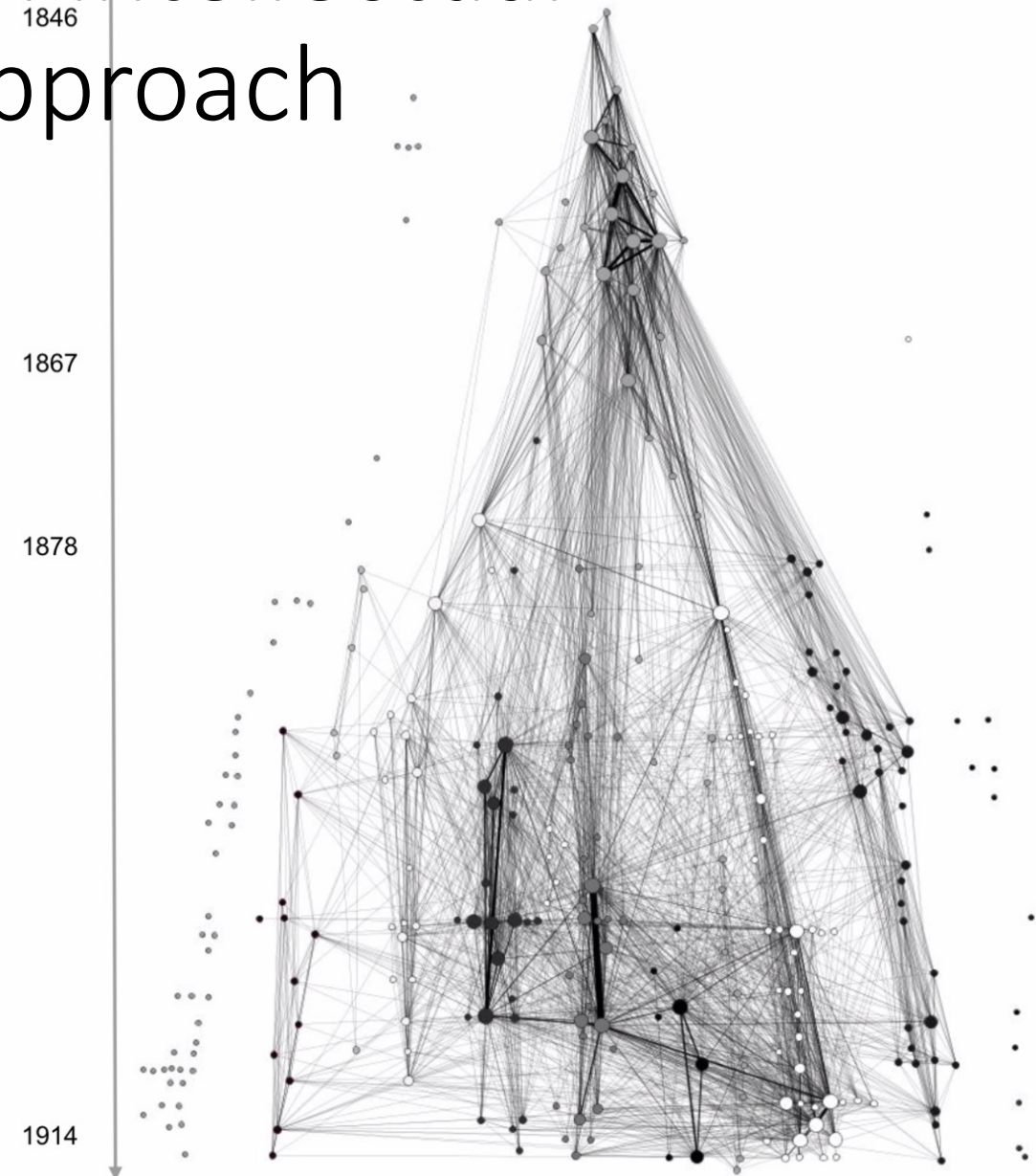


Mobility and movements in intellectual history: a social network approach

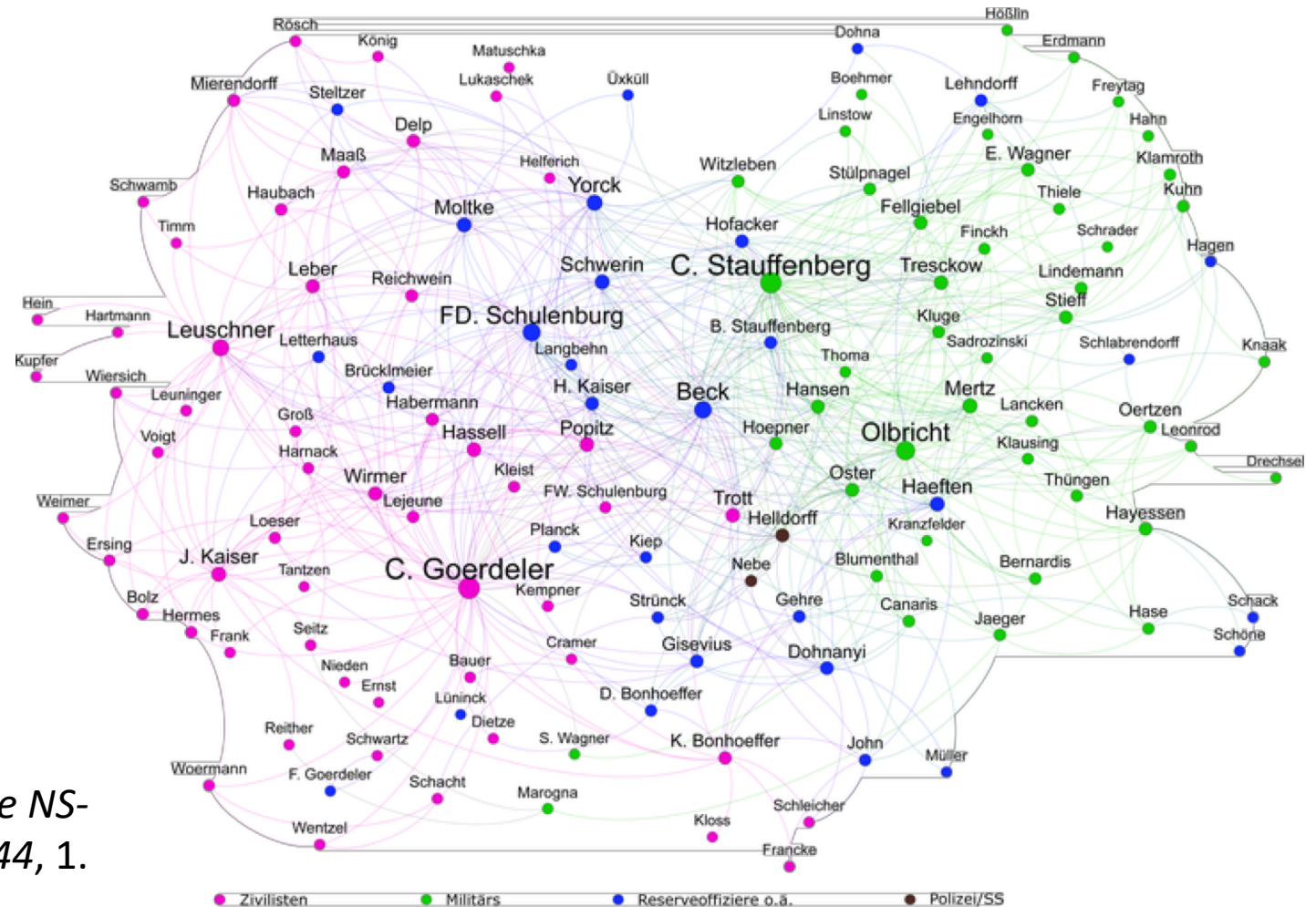
Our global objective in this project is to understand the multiple meanings behind and effects of temporary (cultural) mobility, in particular the visits, exchanges, journeys and congress participation of students, lecturers, experts, scientists, activists, etc in the long 19th century

“Which congresses were visited by reformers from the Low Countries (central graph), which were not visited (49 congresses, black nodes, plotted left) and isolated congresses who were visited by only a few reformers who did not visited other congresses (20 congresses, grey nodes, plotted right).”

Mobility and movements in intellectual history : a social network approach, Christophe Verbruggen (UGent) , Thomas D'haeninck (UGent) and Hans Blomme (UGent) in: The power of networks : prospects of historical network research in Digital Research in the Arts and Humanities (2019)

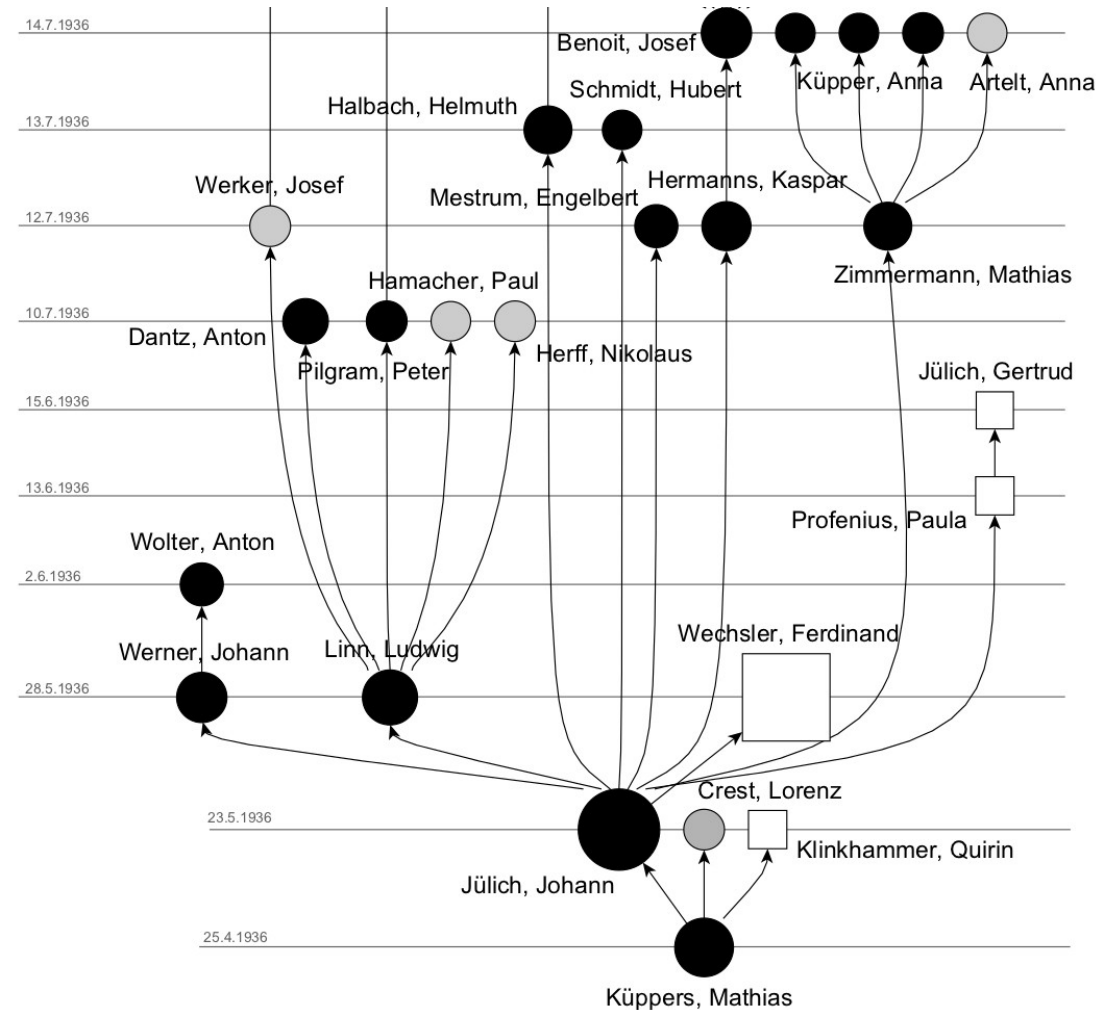


L. v. Keyserlingk-Rehbein, “Nur eine ganz kleine Clique”



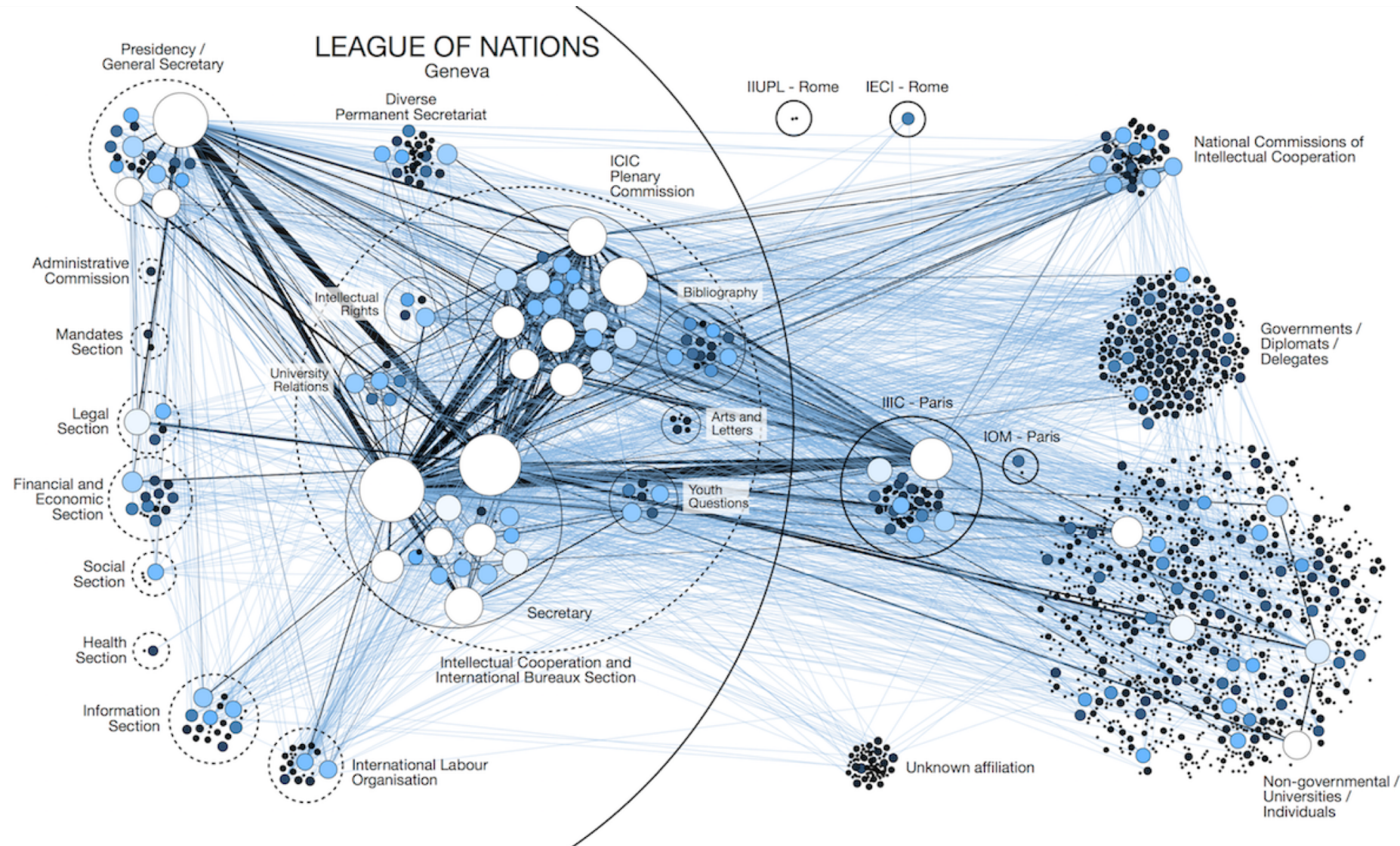
L. Keyserlingk, *Nur eine »ganz kleine Clique«? Die NS-Ermittlungen über das Netzwerk vom 20. Juli 1944*, 1. Auflage. Berlin: Lukas Verlag für Kunst- und Geistesgeschichte, 2018.

Ulrich Eumann, Communist resistance in Cologne



Ulrich Eumann/Jascha März: Netzwerke des Widerstands in Köln 1933-1945. Forschungsprojekt, in: The International Newsletter of Communist Studies Online XVI (2010), no. 23, p. 37-41.

“Les réseaux de la coopération intellectuelle. La Société des Nations comme actrice des échanges scientifiques et culturels dans l’entre-deux-guerres”



Grandjean Martin “Les réseaux de la coopération intellectuelle. La Société des Nations comme actrice des échanges scientifiques et culturels dans l’entre-deux-guerres”, PhD thesis, Lausanne, Université de Lausanne, 2018, 600p.

Shared characteristics

1. Use SNA methods to map and reconstruct complex historical social relations
2. Critical reflection of the underlying sources
3. SNA as partial solution to
 - Reconstruct historical scopes of knowledge
 - Understand properties of communication systems
 - Identify key players
 - Observe change over time
 - Assess the relevance of interactions
4. SNA confirms/challenges assumptions, guides follow-up historical research

Main challenges

- Cost for data collection vs. added value
- Represent historical complexity in data models
- Compensate for missing and uncertain data
- Skill development for authors
- Communicate findings to peers (incl. skill dev.)

A new branch of HNR?

The essence of historical work:

The coupling of heterogeneous sources and artefacts facilitates the „Creation of a form in which one source sheds light on another“

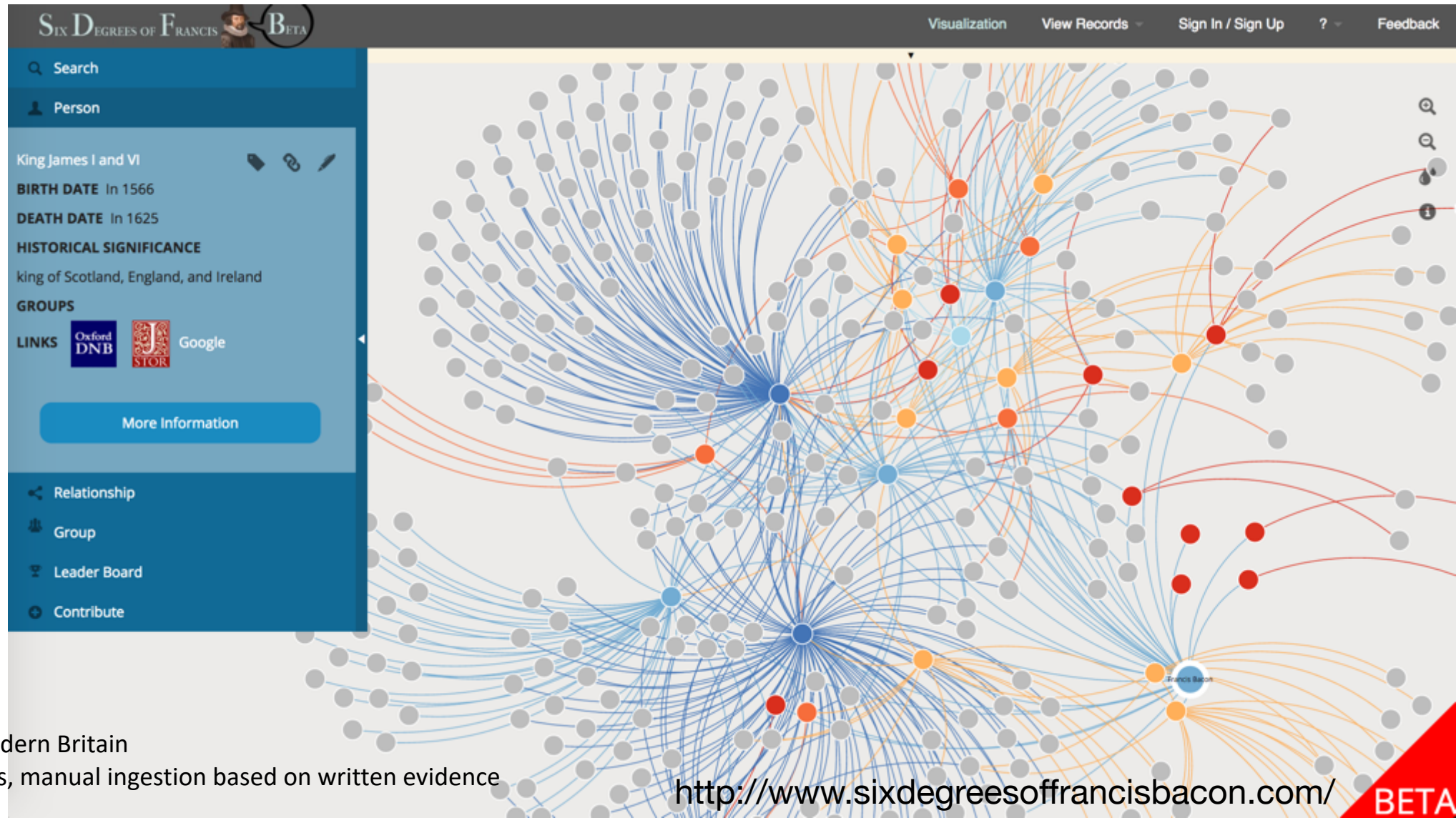
Raul Hilberg



Networks as Gateways

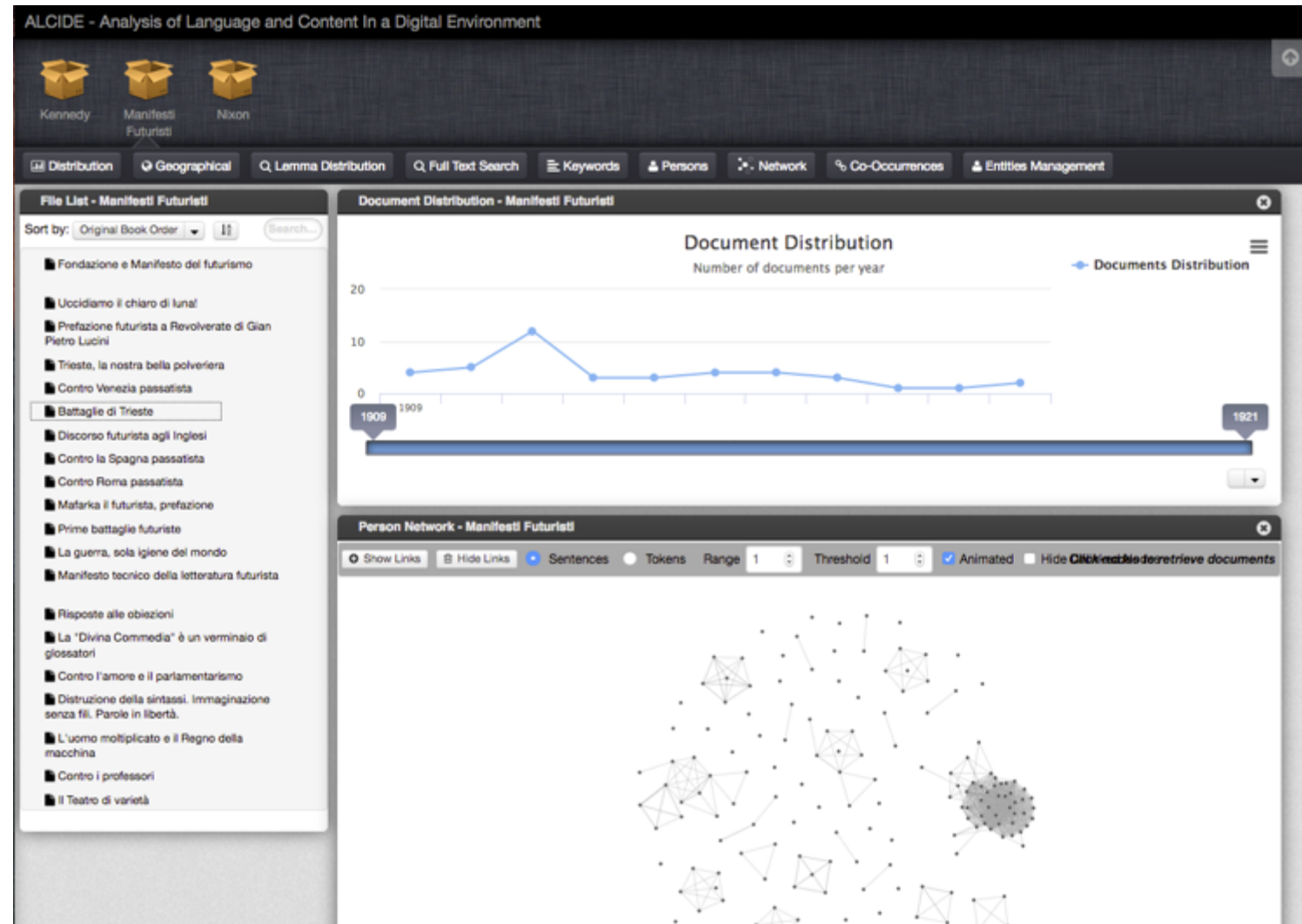
<http://historicalnetworkresearch.org/bibliography/#Interactive%20Graph%20Exploration>

Six Degrees of Francis Bacon



Nodes: Persons living in Early Modern Britain
Edges: Inferred by co-occurrences, manual ingestion based on written evidence

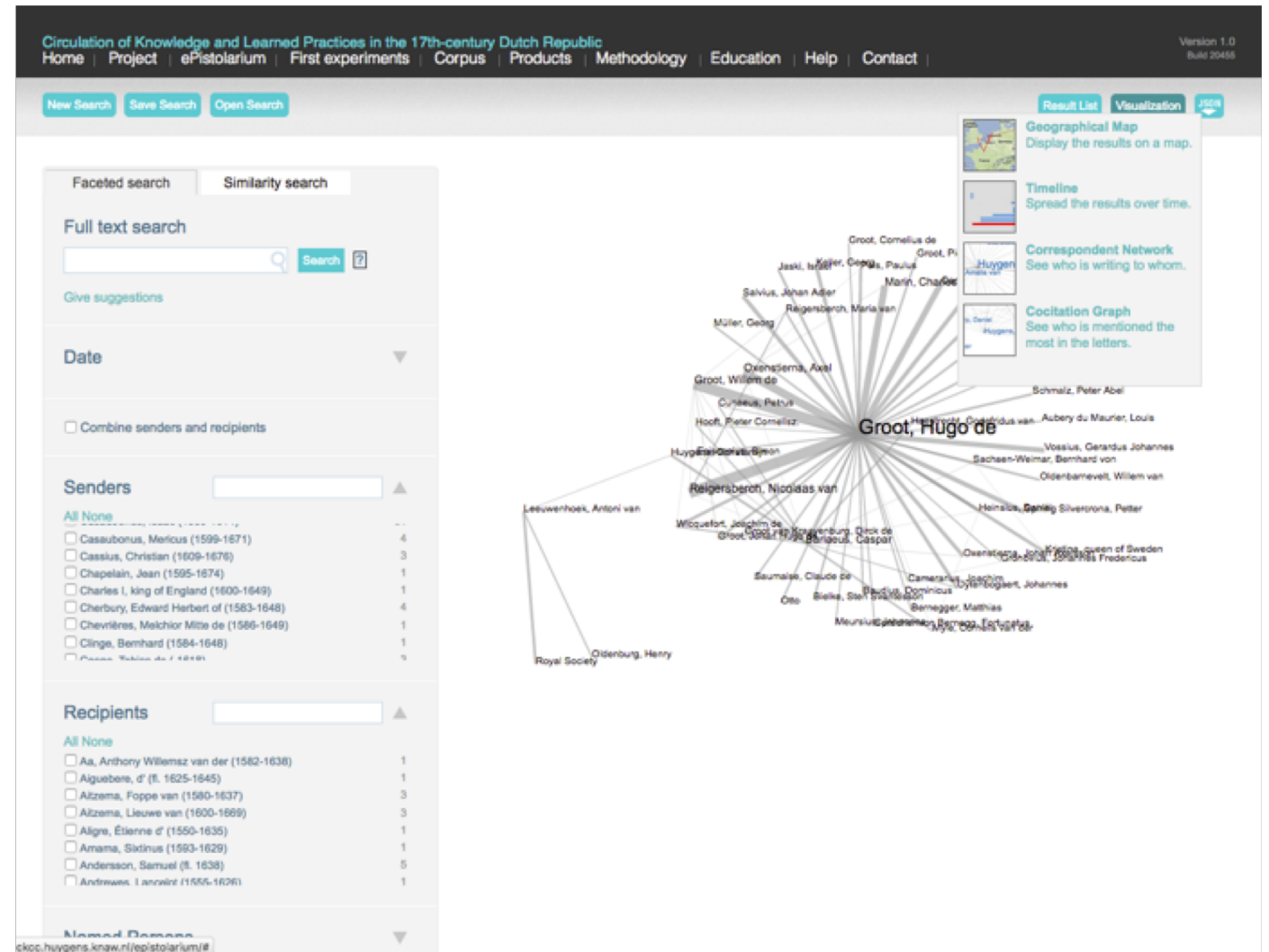
ALCIDE



<https://dh.fbk.eu/projects/alcide-analysis-language-and-content-digital-environment>

Nodes: Named entities
Edges: Co-occurrences

Epistolarium



Nodes: Early modern letter writers
Edges: Letters sent

<http://ckcc.huylgens.knaw.nl/epistolarium/>

Humanities Networked Infrastructure

huni Search Collections About - My HuNI - Help - Log out Marten Düring

Create a new link Cancel

Step Three Add a note and save your link

Denise McAvaney Director ⇄ McAvaney Media Pty Ltd

McAvaney Media Pty Ltd Employed ⇄ Denise McAvaney Save link

LINK NOTES: Add note

CONCEPT: New South Wales State Archives Collection

<http://huni.net.au/>

Nodes: Persons, objects, institutions
Edges: Metadata inferred / manually created

SNAC

social networks and archival context
 PROTOTYPE HOME
 ABOUT PROTOTYPE
snac

Barnum, P.T. (Phineas Taylor), 1810-1891 Alternative names

Dates: birth 1810-07-05 death 1891-04-07 Gender:	Maybe same as: Barnum, P. T. 1810-1891. Barnum, J. P. Authority Source: WorldCat, VIAF, LC, harvard, syru, aps, LAC, NLA, nyppl, uml, lc Nationality: United States Language: English
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Biographical notes:



Epithet: showman
British Library Archives and Manuscripts Catalogue :
Person : Description :
arlc/81055

Links to collections

- 🔗 Archival Collections
132
- 🔗 Related Resources
103
- 🔗 Related External Links
6

Related names in SNAC

- 👤 People
91
- 🏠 Families
2
- 🏢 Organizations
11

Visualize:

List collection locations

Radial Graph Demo

View source EAC-CPF

Subjects:

- Advertising--Circus
- Albinos and albinism
- Aquariums
- Authors
- Circus
- Circus -- United States
- Circus owners--Correspondence
- Circus performers
- Circus--History
- Circuses--History--Sources
- Elections--Corrupt practices
- Jumbo (Elephant)
- Menageries
- Natural history museums--History
- Sea monsters

Occupations:

- Circus owners
- Circus owners.

Image from Wikipedia

/vdc_100000000814.0x0001b6

Phineas Taylor ("P.T.") Barnum (1810-1891) was a celebrated showman.

From the description of Papers, n.d.; 1854-1879. (American Antiquarian Society). WorldCat record id: 191285307

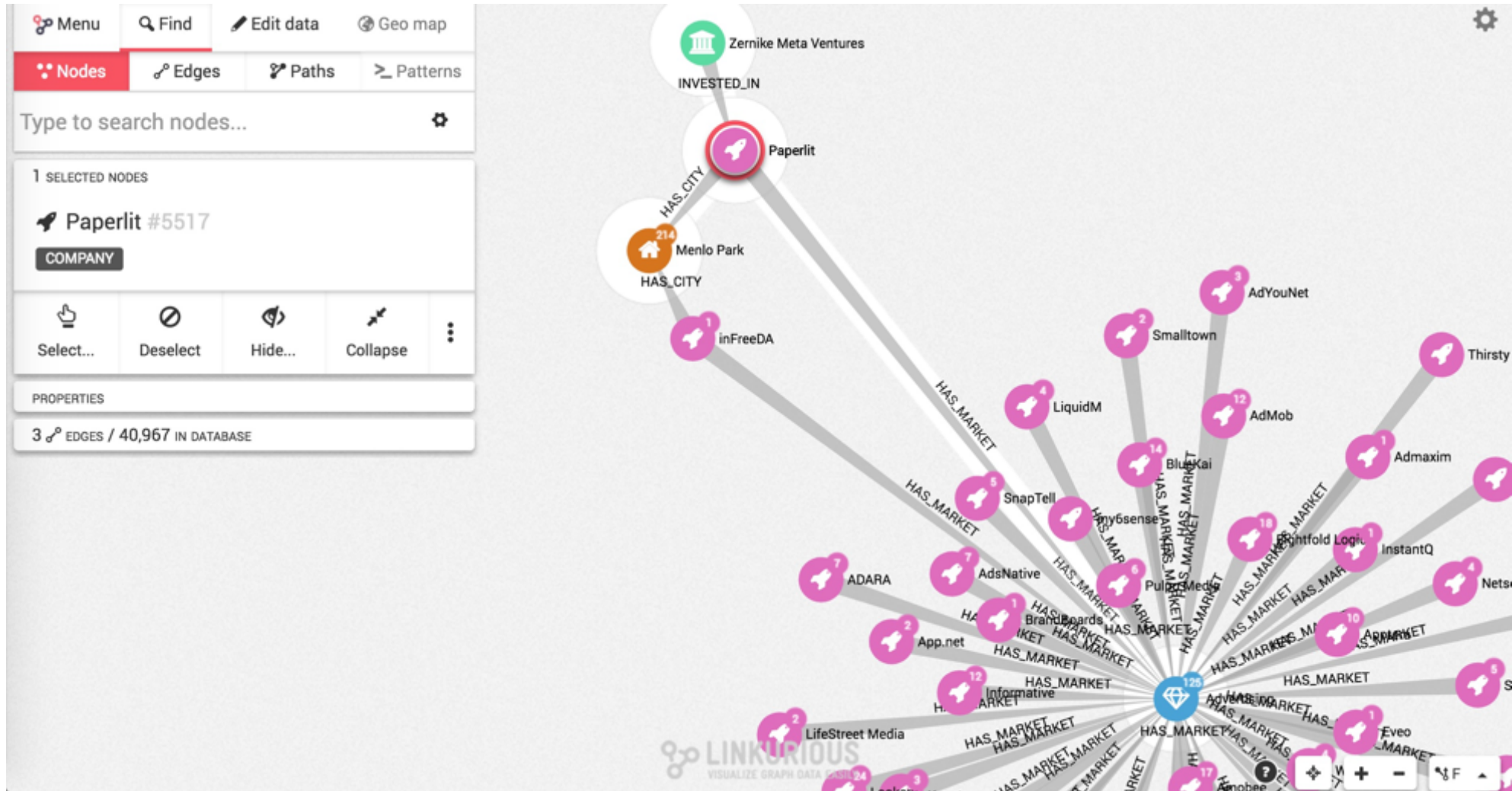
American showman and entrepreneur.

From the description of P. T. Barnum letters, 1854-1868. (Cornell University Library). WorldCat record id: #0016489.

Nodes: Persons, objects, institutions
Edges: Metadata inferred

<http://socialarchive.iath.virginia.edu/snac/search>

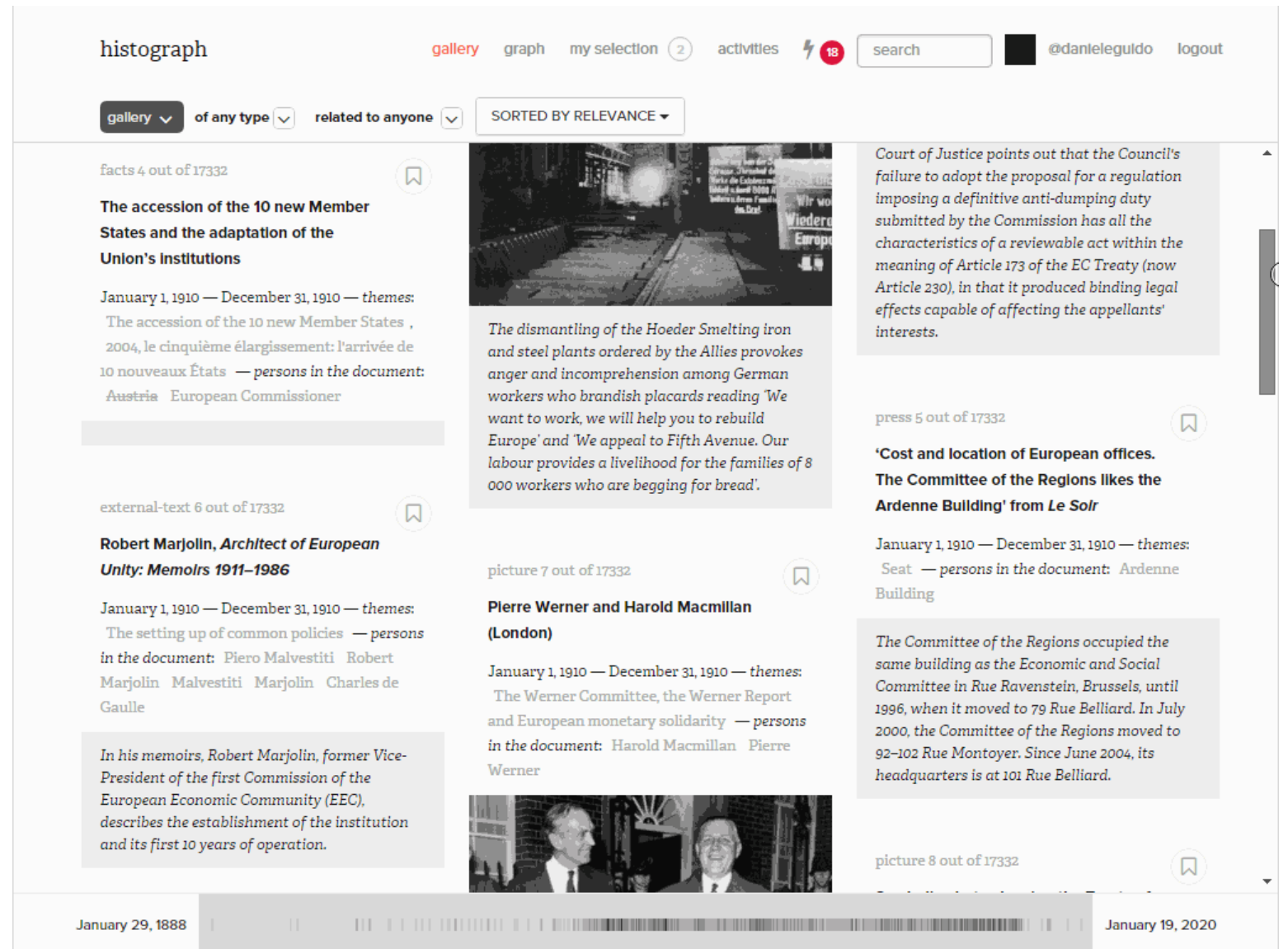
Linkurio.us



Nodes: Named entities

Edges: co-occurrences and (?)

With:
Lars Wieneke
Daniele Guido

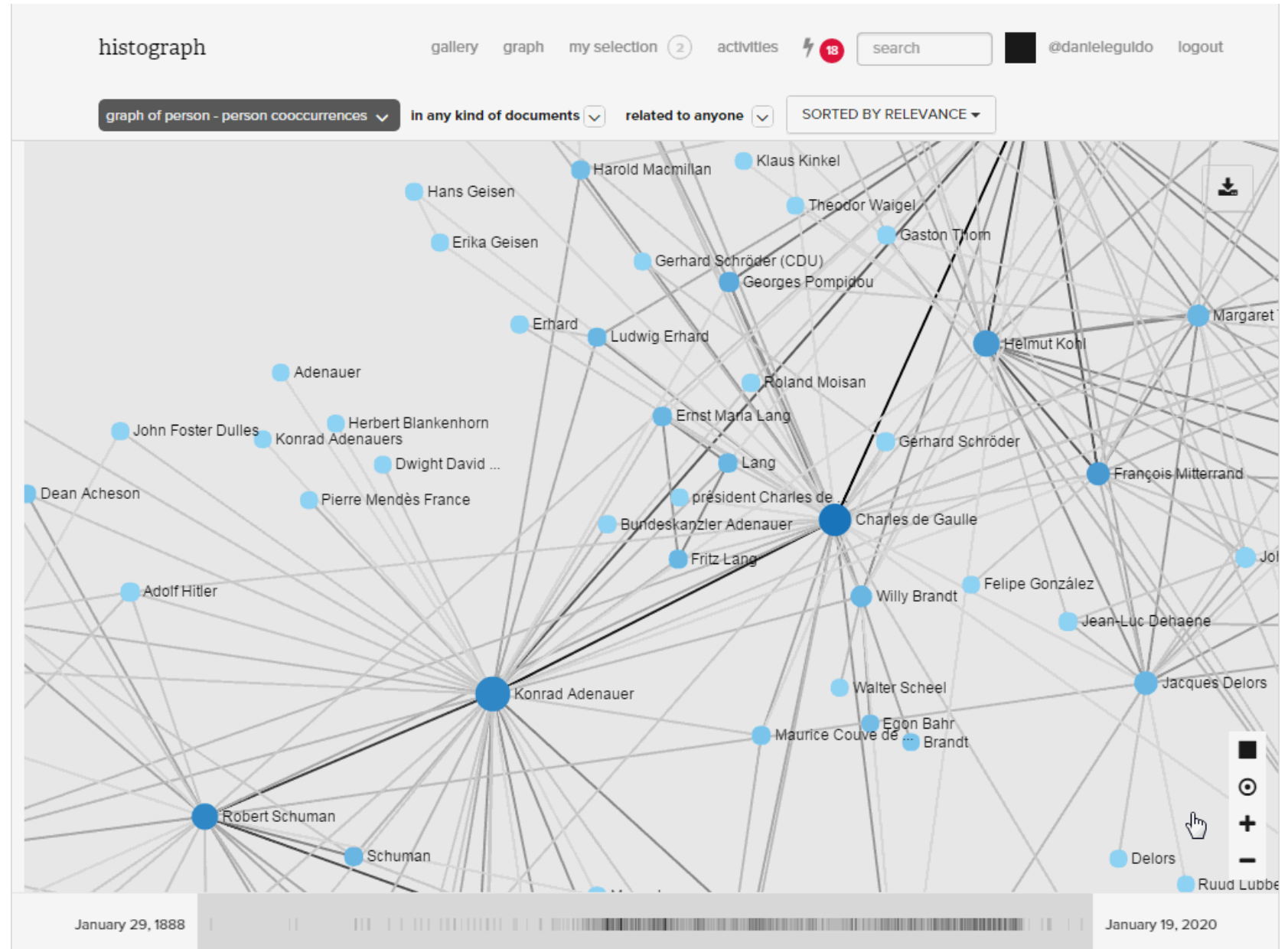


Nodes: Named entities
Edges: Co-occurrence in multimedia documents

<http://histograph.eu/>

Histogram

With:
Lars Wieneke
Daniele Guido



Nodes: Named entities
Edges: Co-occurrence in multimedia documents

<http://histograph.eu/>

Histograph

With:

Lars Wieneke

Daniele Guido

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On 19 and 20 February 1957, in Paris, the Heads of Government accompanied by the Ministers for Foreign Affairs of the six Member States of the European Coal and Steel Community (ECSC) reach a definitive agreement on the financial aspects of the regime for the association of the Overseas Countries and Territories (OCT) with the European Economic Community (EEC). From left to right: Achille Van Acker (Belgium), Konrad Adenauer (FRG), Guy Mollet (France), Antonio Segni (Italy), Willem Drees (Netherlands) and **Joseph Bech** (Luxembourg).

picture 5 out of 9



Arrival of Joseph Bech and Paul-Henri Spaak at the Capitol (Rome, 25 March 1957)

March
of the
de Rome — persons in the document: **Joseph Bech** Paul-Henri Spaak

Joseph Bech - Prime Minister of
Luxembourg (1887 - 1975)



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**The Luxe
Rome Tre**

March 25,
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Rome —

histograph

- **Exploration** of a multimedia corpus by means of filters, search, graph vis, timeline, recommender system, shortest path queries
- **Annotation** of a multimedia corpus based on NER, manual annotation, enrichment with VIAF & dbpedia IDs

BLIZAAR - *HyBrid VisuaLIZation of DynAmic MultilAyer GRaphs*



Luxembourg National
Research Fund

*This work was (partially) funded by the ANR grant BLIZAAR
ANR-15-CE23-0002-01 and the FNR grant BLIZAAR
INTER/ANR/14/9909176.*



BLIZAAR - *HyBrid VisuaLIZation of DynAmic MultilAyer GRaphs*

(1) Content overview

I would like to have an **overview** of how a **specific** person/institution/location is represented in the corpus and of the other entities with whom they are mentioned. This helps me to decide which documents I want to study in greater detail.

(2) Query knowledge expansion

I am interested in a **topic** but simple keywords are not suitable to retrieve relevant documents. Starting with my limited knowledge of the topic I want to receive **suggestions** for promising contents and additional keywords which can **guide** my exploration.

BLIZAAR - *HyBrid VisuaLIZation of DynAmic MultilAyer GRaphs*

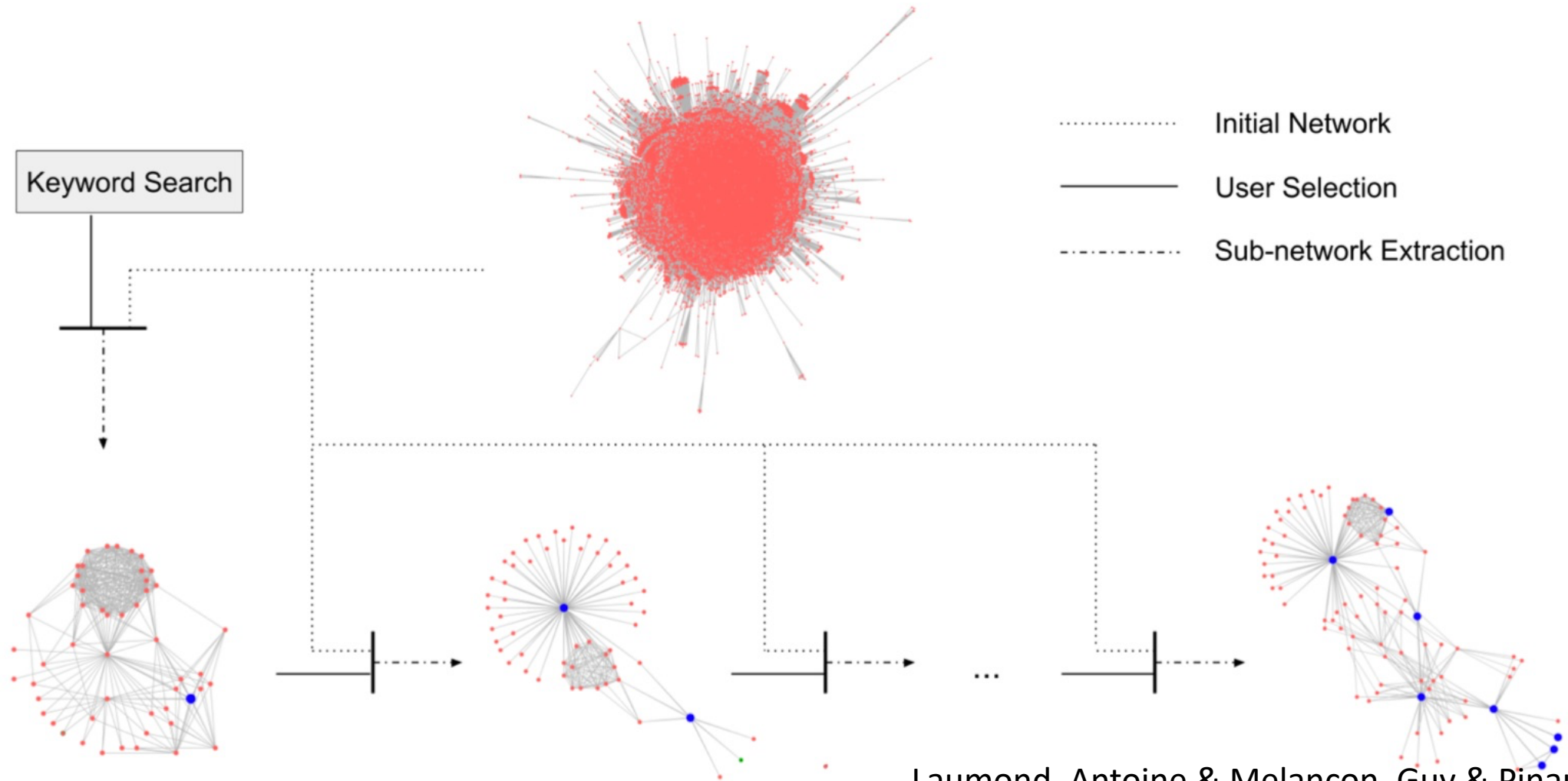
(3) Explore search results

I am interested in a broader topic but am **overwhelmed** by the very large number of diverse search results. I want to be able to **dissect and organize** these results and understand how they are related to each other and their attribute values.

(4) Entity comparison

I want to **compare** specific entities (persons, institutions, locations, but also collections) in the corpus so as to get a better understanding of their presence in the corpus. I want to study how the **contexts** (entities) in which they appear **change over time**. I want to explore links between the entities I compare.

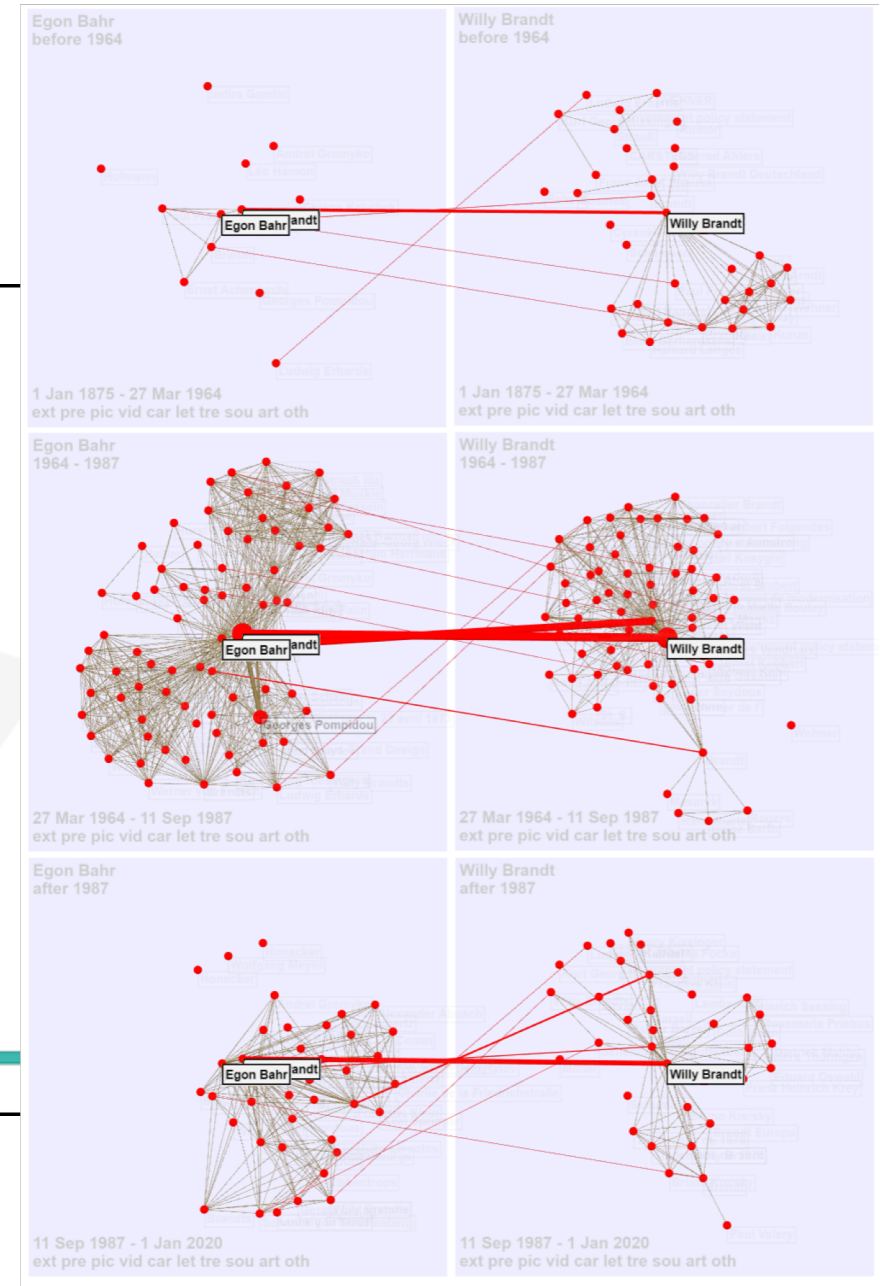
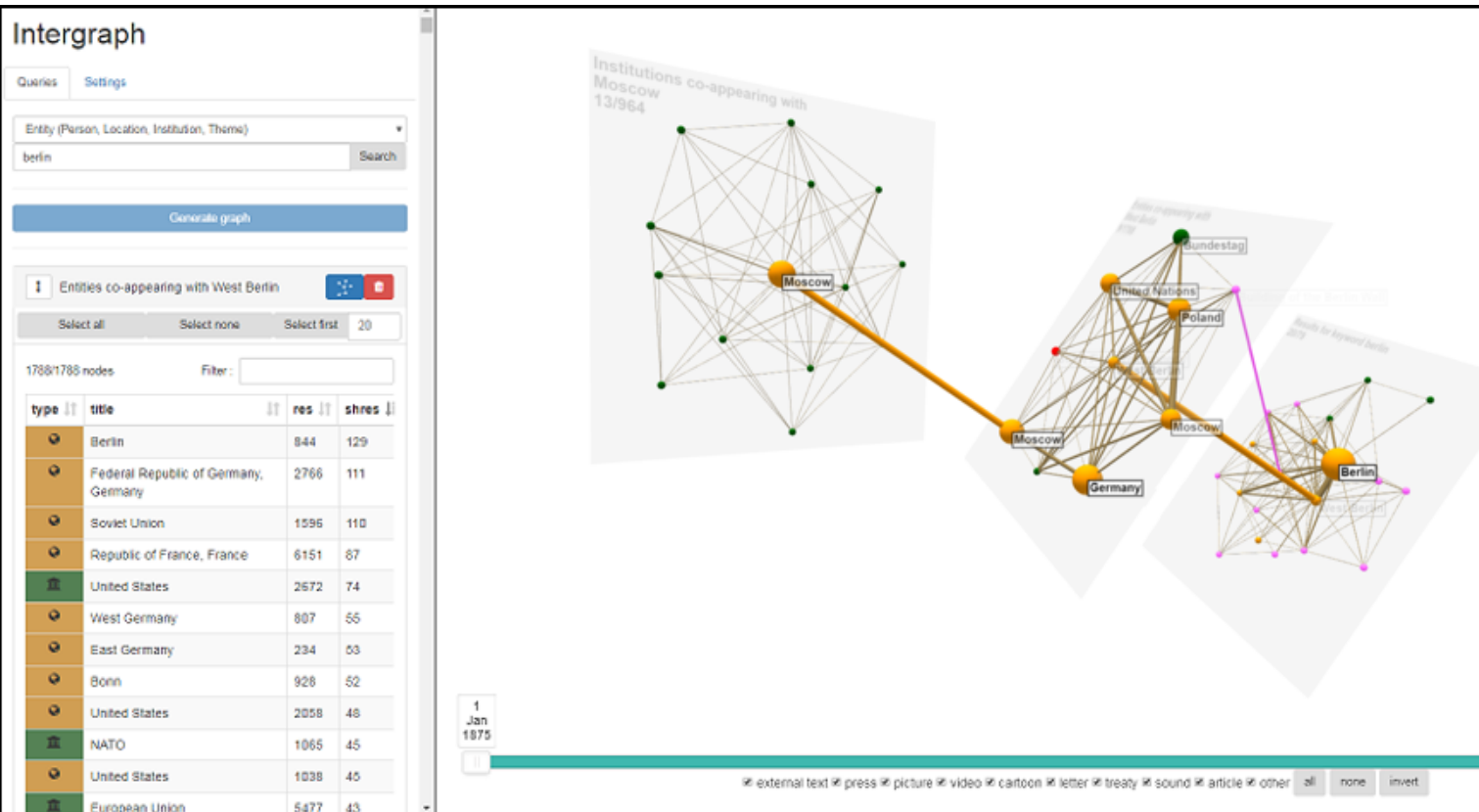
M-QuBE 3



Nodes: entities in the histography dataset
Edges: co-occurrences filtered by degree of interest-based algo

Laumond, Antoine & Melançon, Guy & Pinaud, Bruno & Ghoniem, Mohammad. (2019). M-QuBE 3 : Querying Big Multilayer Graph by Evolutive Extraction and Exploration.

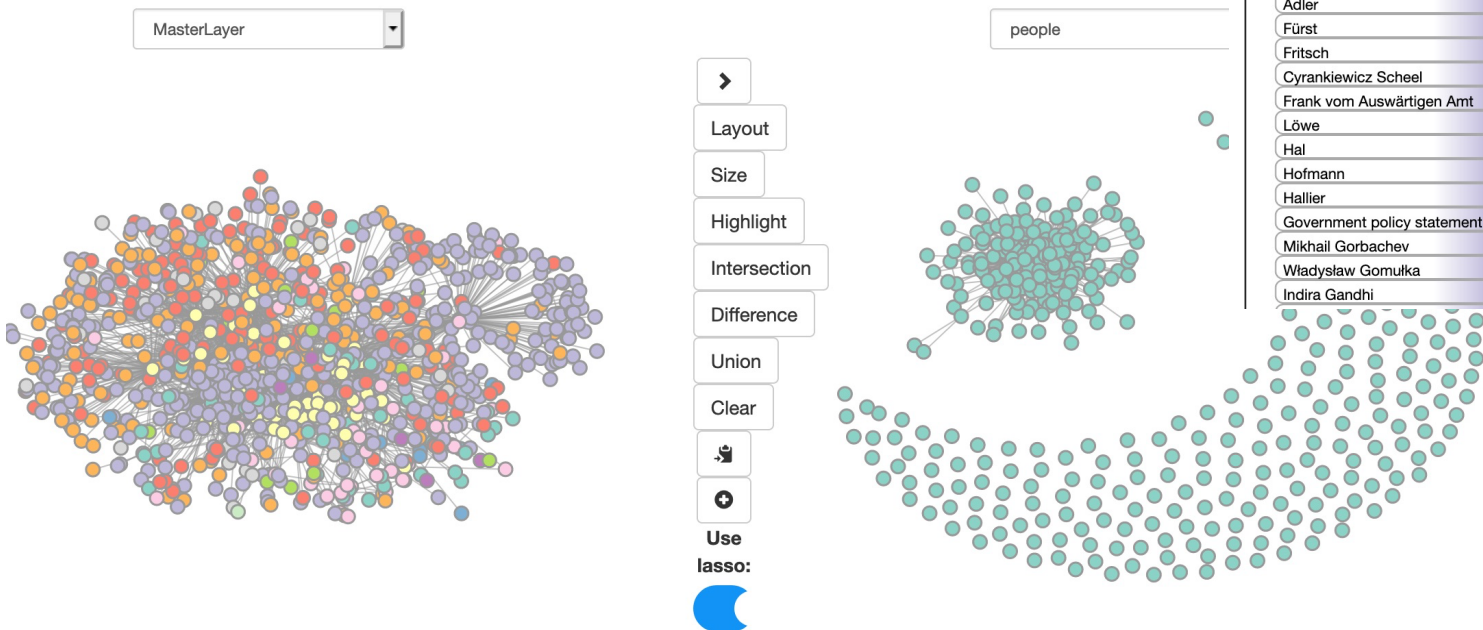
Intergraph



Nodes: entities in the histography dataset
Edges: co-occurrences filtered by Jaccard index

LIST

Layer Comparison View



Entity Type:	person	Entity of Interest:	Egon Bahr (127)
people	organizations	documents	locations
Marshall	European Economic Community	Interview with Egon Bahr: the...	Republic of France, France
François Mitterrand	Atlantic Community	Interview with Egon Bahr: the...	Frankfurt am Main, Germany
Richard von Weizsäcker	Éditions Albin Michel	Letter from the FRG to the...	Federal Republic of Germa...
Roman Herzog	European Central Bank	Short biography of Egon Bahr	Azores
Werner	European Union	'Brandt falls to his knees in...	Reykjavik
Walter Henkels	Éditions Albin Michel	Egon Bahr, Zu meiner Zeit	Russia
Klaus von Bismarck	Heidsieck & Co	Note from Egon Bahr on Fra...	Scandinavia
Egon Emmel	Ministry of Foreign Affairs ...	Directives pour un traité en...	Kempten
Siegfried Lenz	Council of Europe	Interview with Egon Bahr: t...	Hungary
Berthold Beitz	European Communities	Interview with Egon Bahr (Me...	Orsay
Klaus Mehnert	European Free Trade Association	Rachèle Raus, Willy Brandt's...	Brussels
Werner von Fritsch	United States Department of...	Interview with Egon Bahr (M...	London
Anny Ahlers	University of Paris	Interview with Egon Bahr (Me...	Lier, Belgium
Eike Duckwitz	European Parliament	Interview with Egon Bahr (Me...	United Kingdom
Zenon Kliszko	European Commission	Caricature de Lang sur le r...	Gap, Hautes-Alpes
Romy Schneider	Non-Aligned Movement	Interview with Egon Bahr (M...	Polish People's Republic
John Glatzel	NATO	Interview with Egon Bahr (...)	Hanover
Arnold Gans	Red Army	The Basic Treaty (21 Decem...	Potsdam
Adler	Council of the European Union	Egon Bahr	Soviet Union
Fürst	Organization of Arab Petrol...	Interview with Egon Bahr	Pakistan
Fritsch	FC Metz	Statement by the Federal M...	East Germany
Cyrankiewicz Scheel	Benelux	The Basic Treaty (21 Decem...	Berlin
Frank vom Auswärtigen Amt	Palestine Liberation Organization	Interview with Egon Bahr: t...	Moscow
Löwe	CDU/CSU	Address given by Willy Bran...	Paris
Hal	Wehrmacht	The Federal Republic of Ger...	Germany
Hofmann	Christian Social Union in Bavaria	Interview with Egon Bahr (M...	West Germany
Hallier	Boeing	Interview with Egon Bahr: t...	Oldenburg
Government policy statement	Bundestag	Rachèle Raus, Egon Bahr an...	Socialist Federal Republic o...
Mikhail Gorbachev	Dtv Verlagsgesellschaft	Willy Brandt and the unifica...	East Germany
Władysław Gomułka	German Air Force	Interview with Egon Bahr: t...	Jordan
Indira Gandhi	United States of Europe	'We ought to have a funeral ...	England

Nodes: entities in the histography dataset
Edges: co-occurrences in documents

Main challenges revisited

Cost for data collection vs. added value	(Semi-)Automated data creation /assisted data creation
Represent historical complexity in data models	Shift the focus from strict models of social structures to a broader notion of connectedness; focus on link detection; externalise network thinking
Compensate for missing and uncertain data	Measures, user curation, documentation
Skill development for authors	Minimize required SNA literacy
Communicating findings to historians (incl. skill dev.)	See above, still tricky Easy to build bridges between datavis and sources

Can this be a viable alternative / complementary to SNA?

What does all this mean for historians?

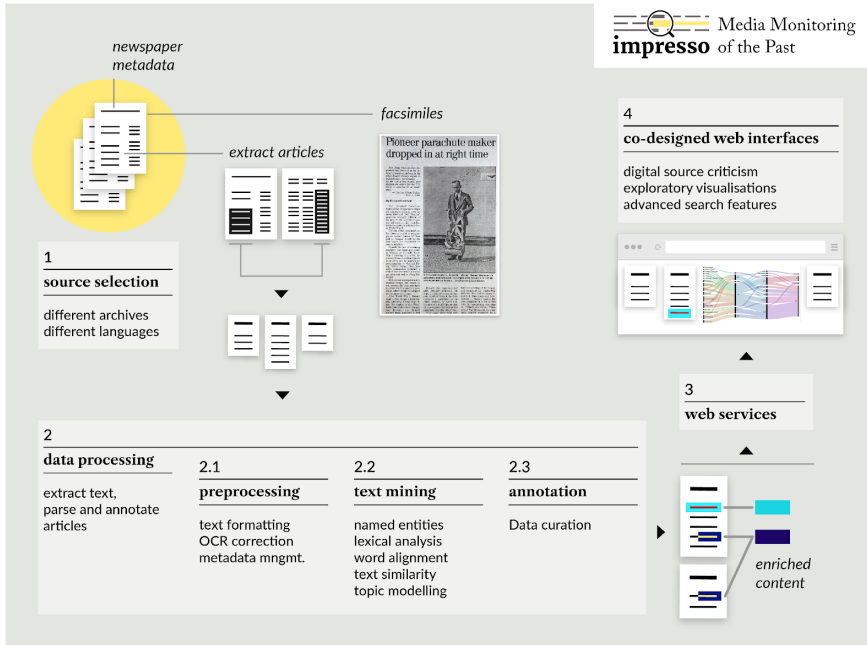
Usable demos, but still highly experimental at this stage.

A lot of work left:

- develop new network-enhanced workflows between SNA and vis
- Create relevant datasets
- Bridge the gap between digital and paper
- Skill development



Media Monitoring of the Past



<https://impresso-project.ch/>

EPFL

Digital Humanities Laboratory (DHLAB) Ecole Polytechnique Federale de Lausanne, Switzerland

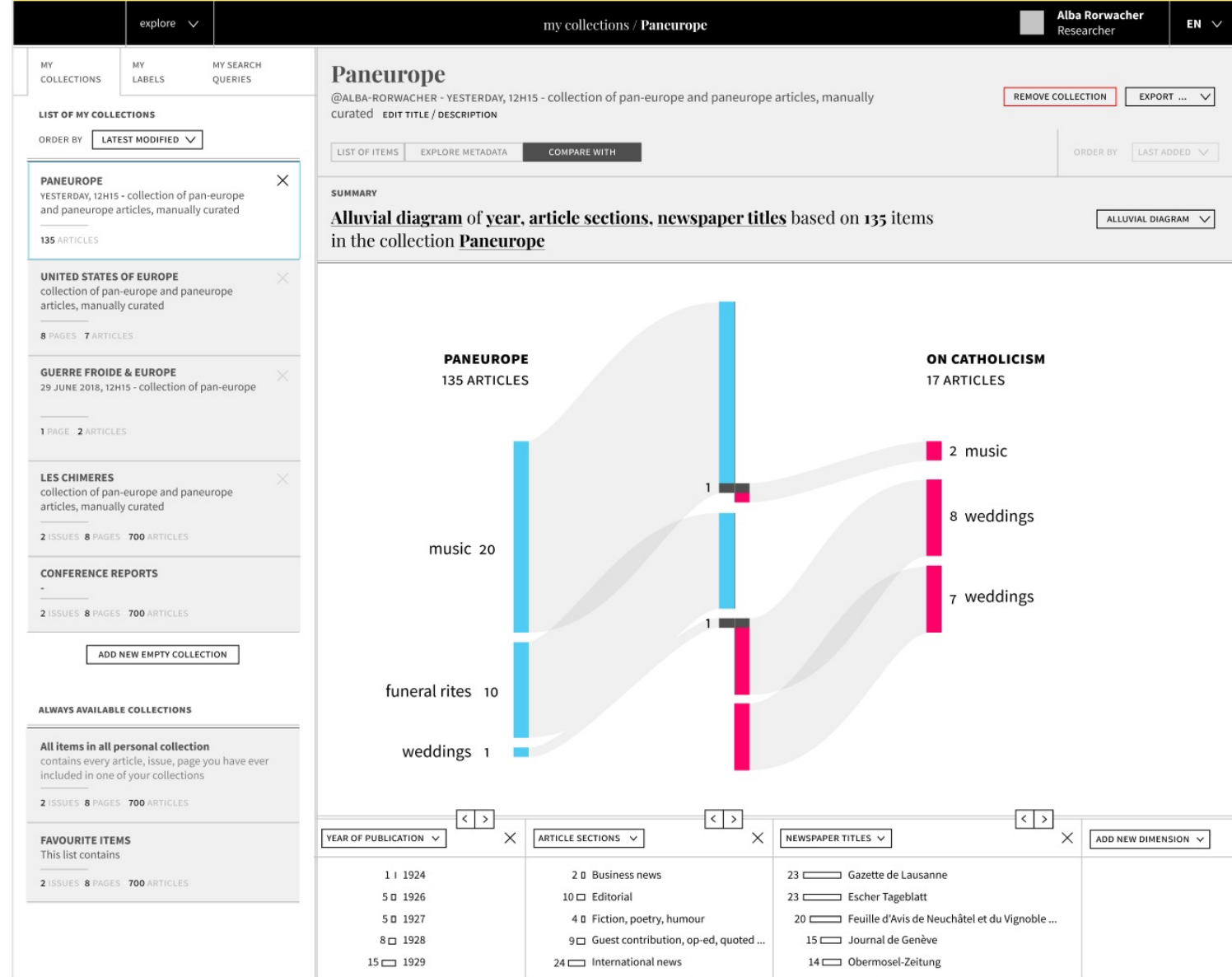


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Centre for Contemporary and Digital History (C2DH) Luxembourg University, Luxembourg.



LE TEMPS
Le Temps



National Library of Luxembourg, BnL



Neue Zürcher Zeitung, NZZ



State Archives of Valais, AEV



History department, University of Lausanne, UNIL



Swiss Economic Archives, SWA



Infoclio

What to read next?

Formal network methods in history: why and how?

Claire Lemerrier

► To cite this version:

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<https://halshs.archives-ouvertes.fr/halshs-00521527>