Übung zur Vorlesung

Informationsvisualisierung

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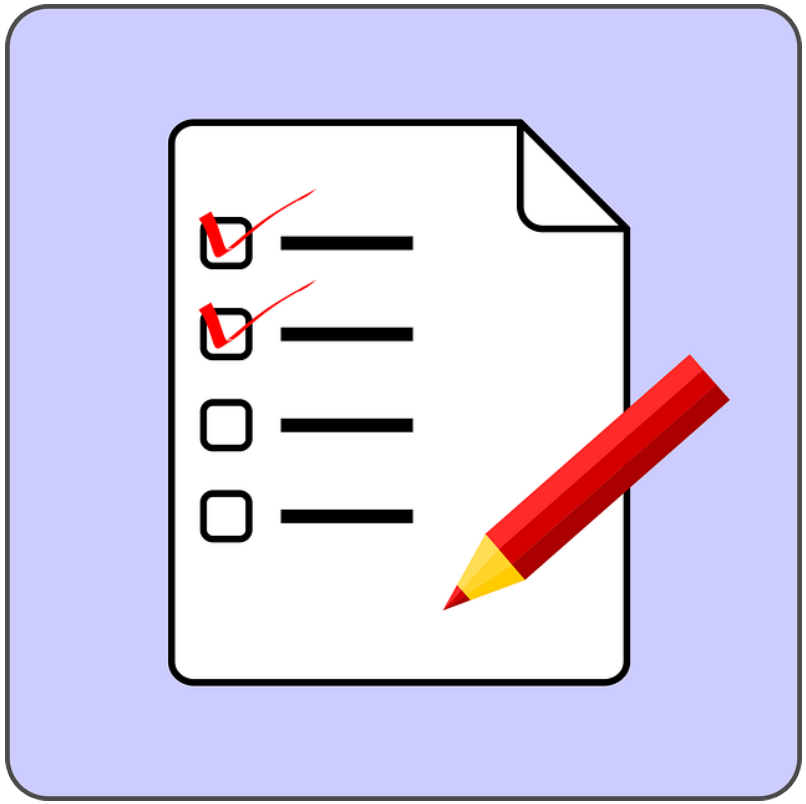
Ludwig-Maximilians-Universität München
Wintersemester 2014/2015

Klausur verlegt!

- **Neuer Termin:**
  - **05.02.15, 16:00-18:00 Uhr**
- **Ort:**
  - **H 030 (Schellingstr. 4),**
  - **S 001 (Schellingstr. 3)**



PubDB

- **Konzepte**
- **Ideen**
- **Fragen**

PubDB: Anforderungen

1P

Eigenständige Entwicklung einer dynamischen Visualisierung (bspw. Glyphen/ muss über die reine Anbindung an ein fertiges Framework hinausgehen)

- ODER -

Implementierung mindestens zweier Ansichten/ Visualisierungen, welche interaktiv verbunden sind (bspw. Click auf einen Knoten innerhalb eines Netzwerks öffnet Detailansicht des Autors)

- ODER -

Implementierung von mindestens 3 Filtern, welche neuartige Einblicke auf die Daten erlauben

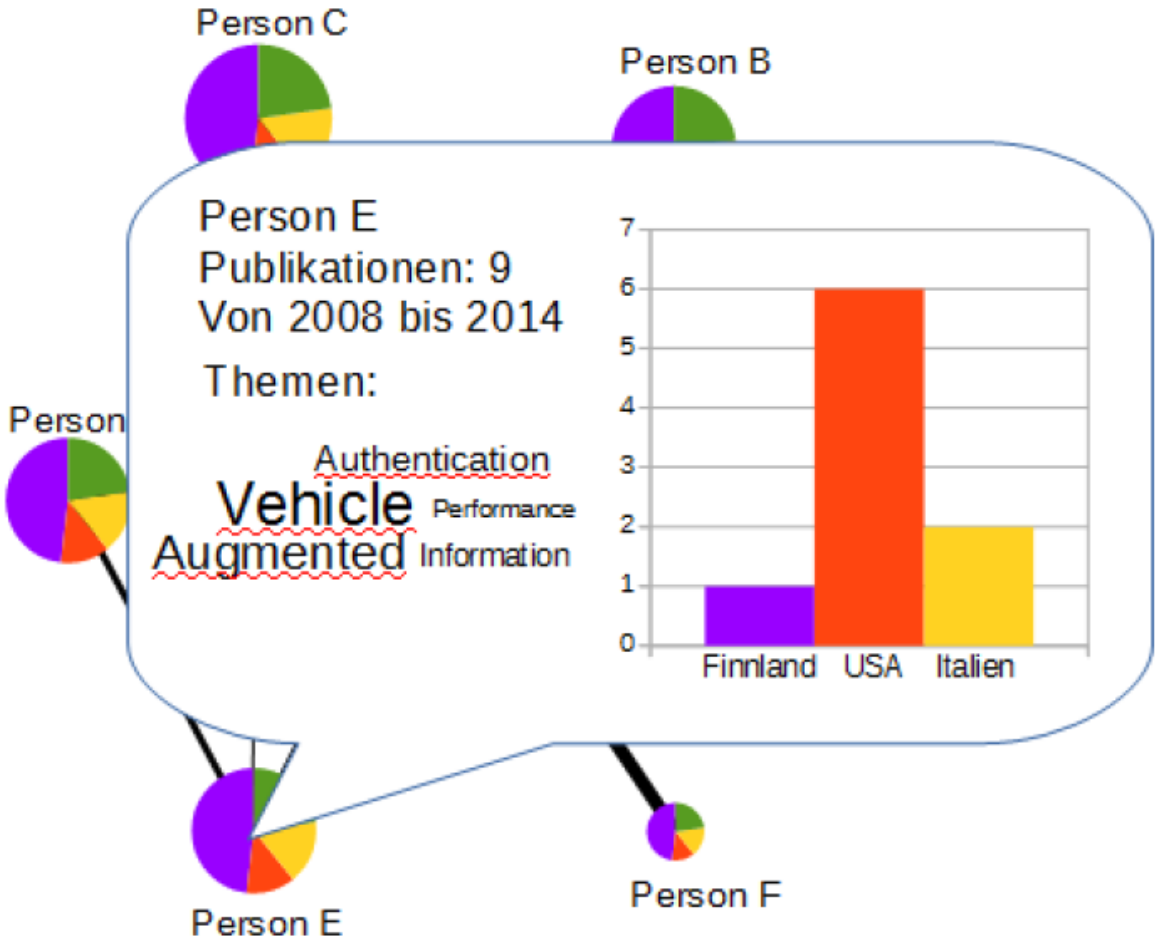
2P

Erfüllung von mindestens zwei Teilaspekten eines Einzelprojekts

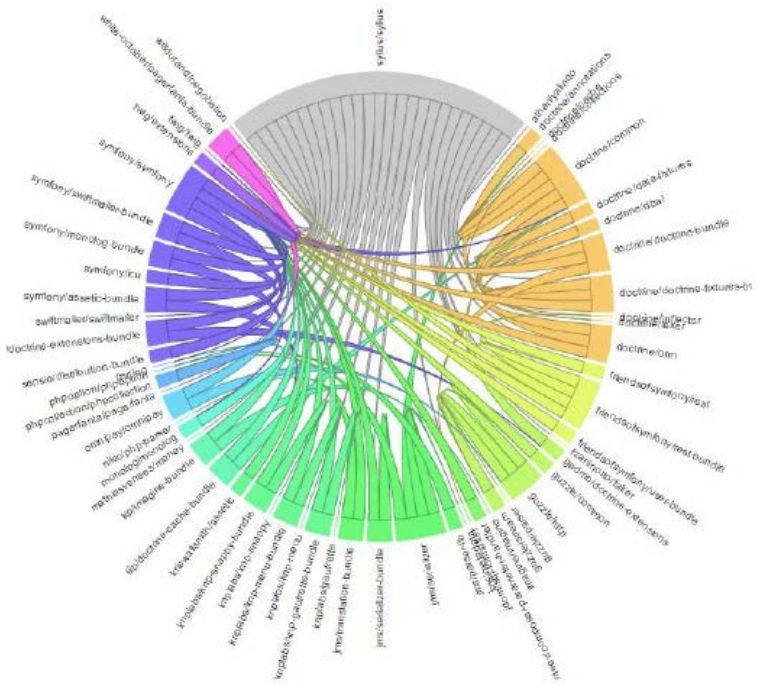
Interessante Aspekte

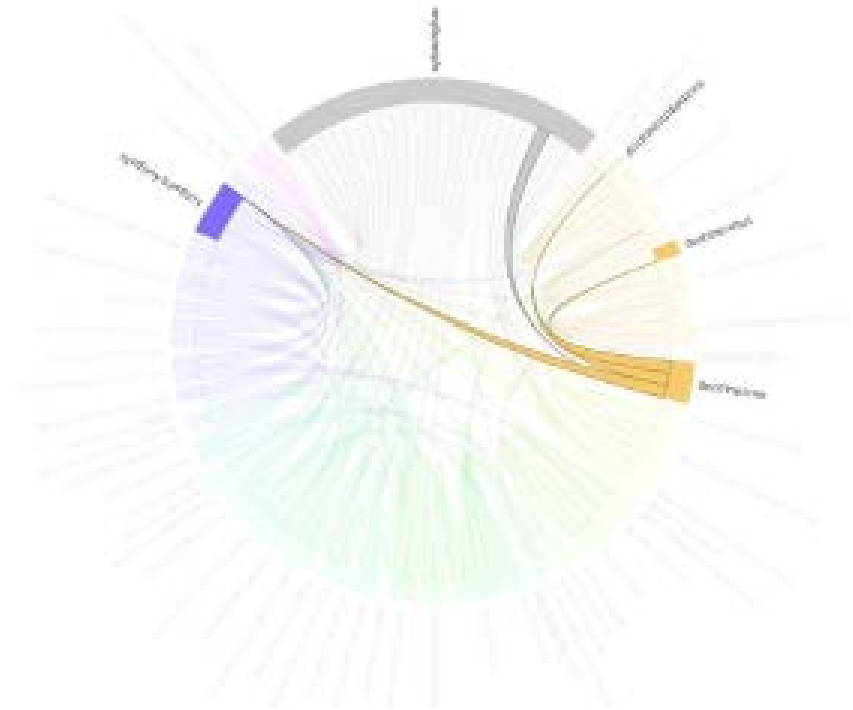
- Beziehungen zwischen Autoren, Konferenzen, Unis, Büros, Stockwerken
- Autor X vs. Autor Y
- Veröffentlichungen pro Jahr, Autor, Konferenz
- Top/Flop Themen, Autoren, Jahre
- Awards
- Anzahl der Zitate, Wer zitiert wen, Wo wird zitiert
- Tagungsorte
- Aktivitätsindex (absolut und zeitbasiert)
- Ähnliche Paper, Keywords
- Filter für Themen, Personen, Jahre, Gruppen
- Veröffentlichungen mit Studenten, externen Personen

Konzeptbeispiel I (1P)



Konzeptbeispiel II (1P)





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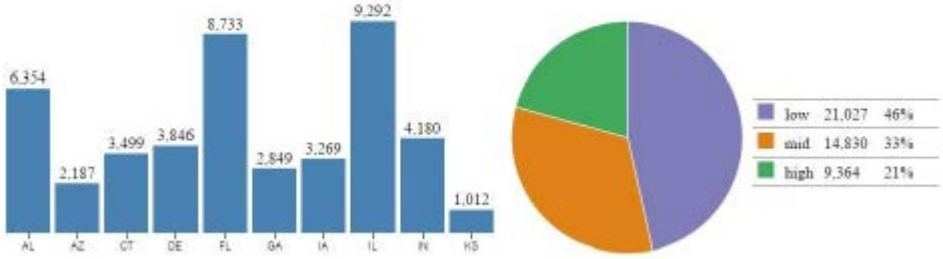
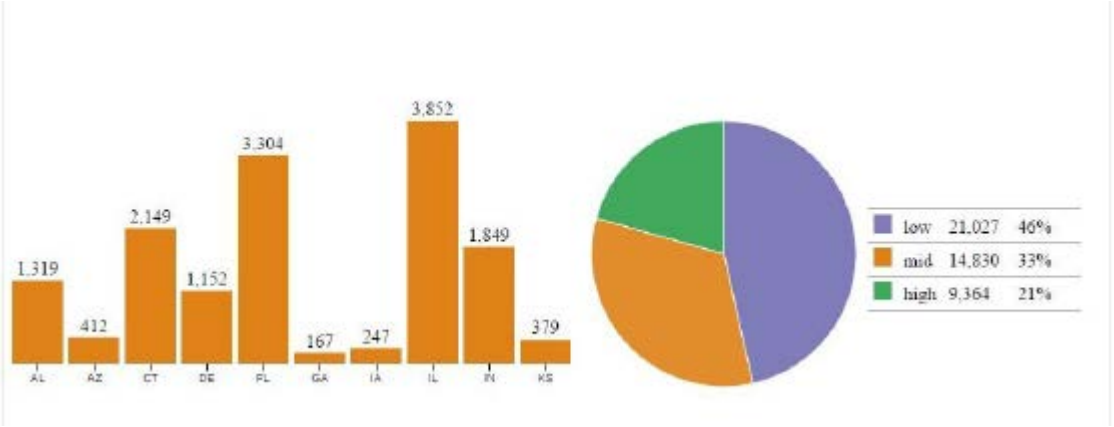
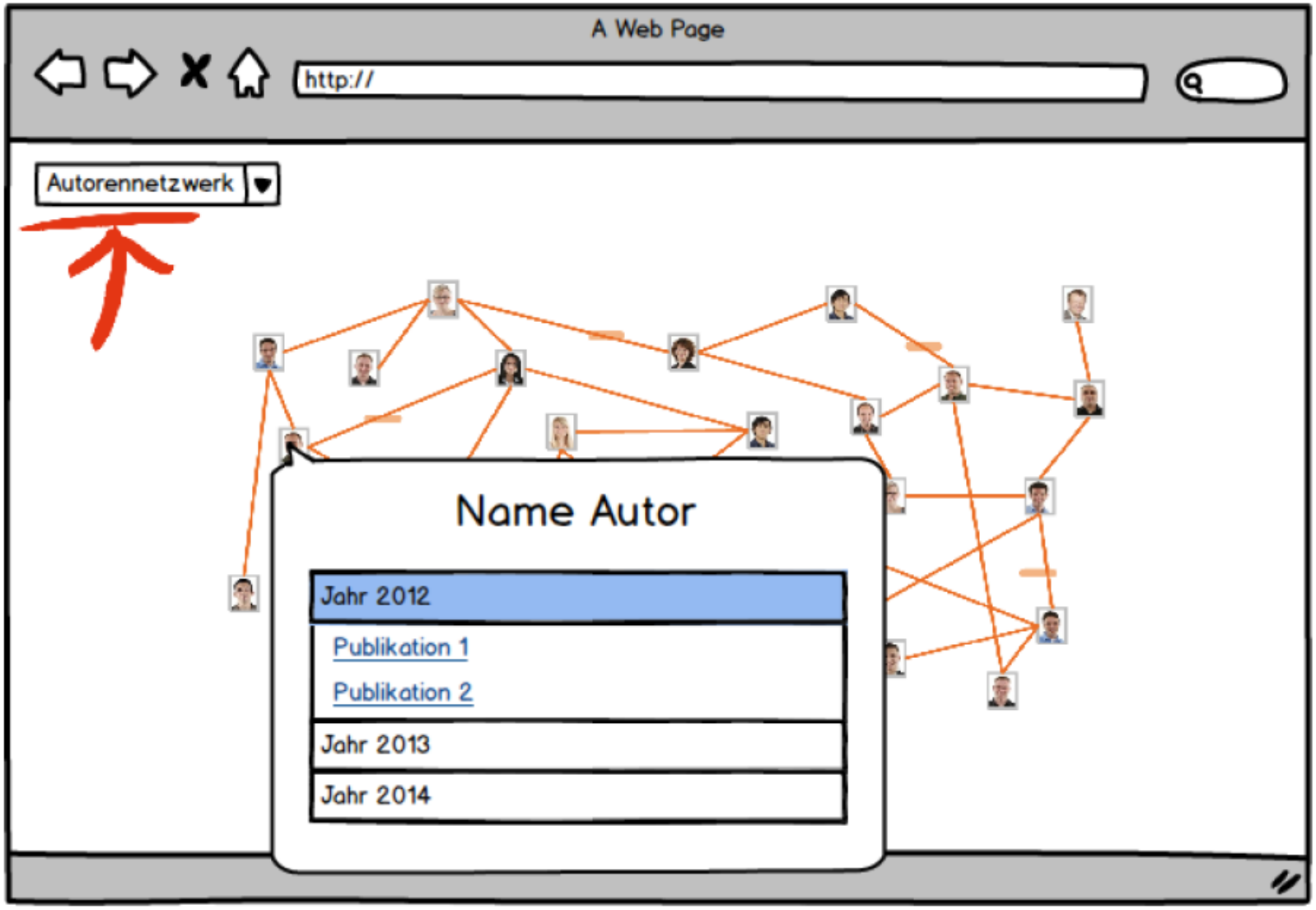
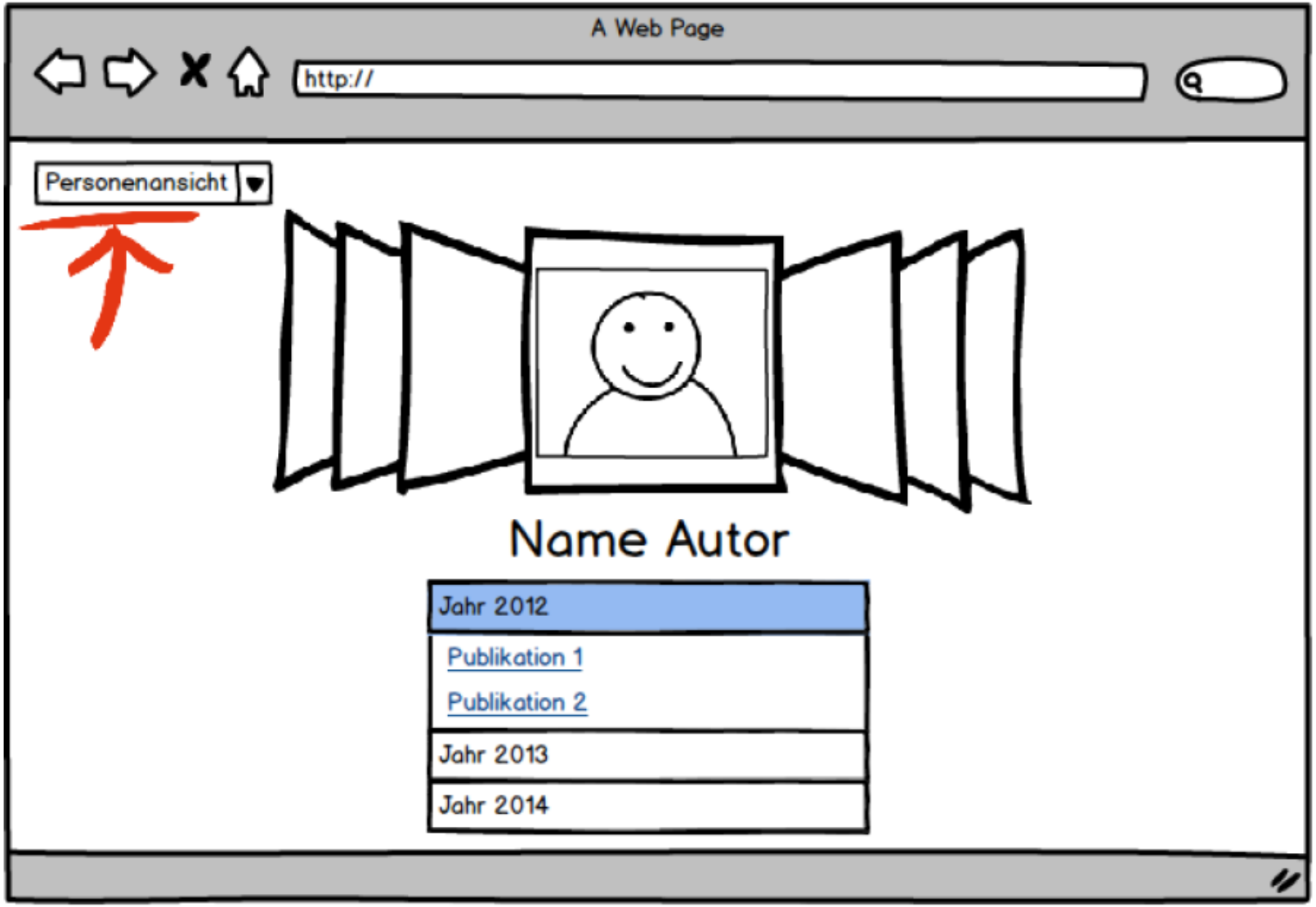




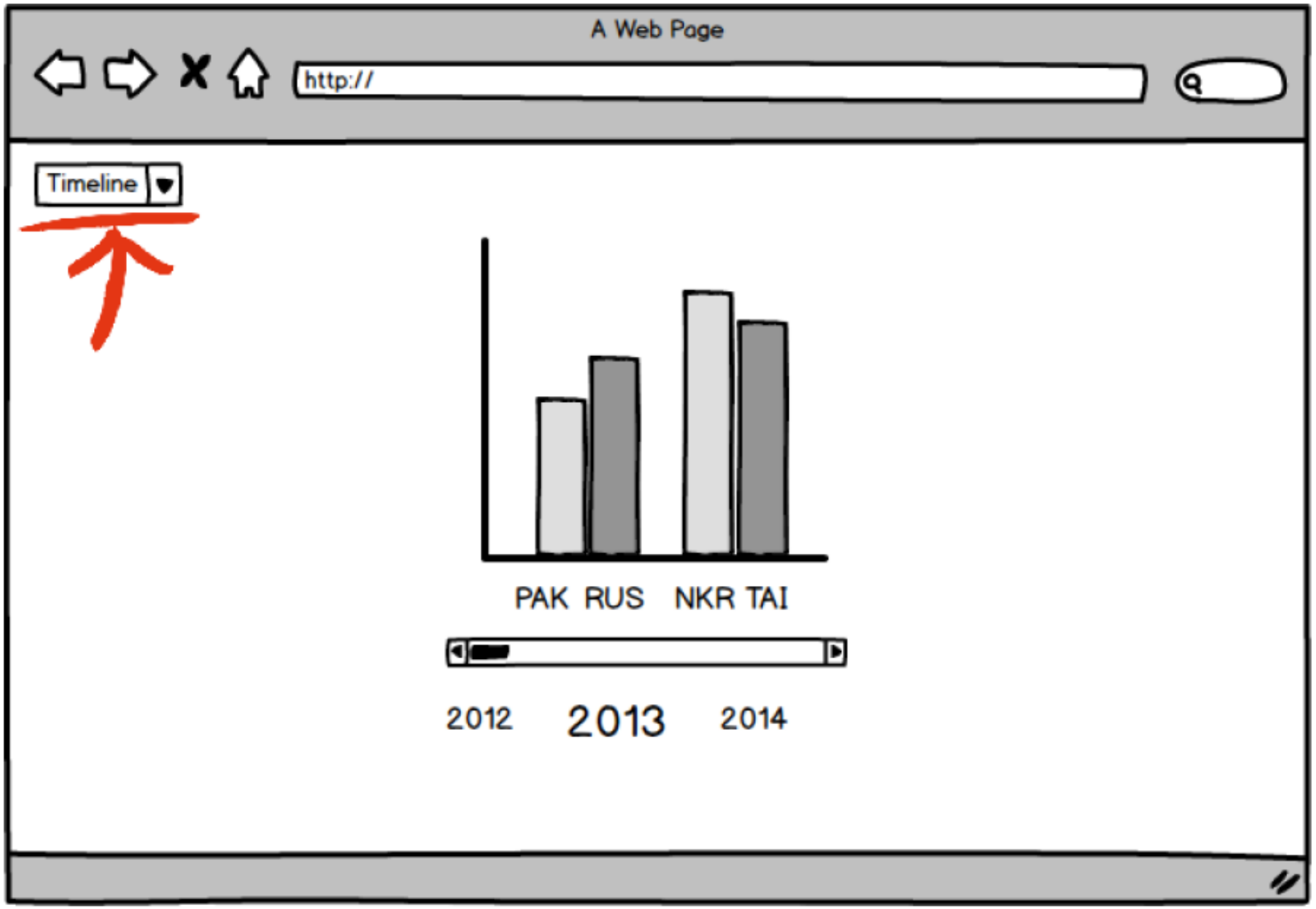
Konzeptbeispiel III (2P)



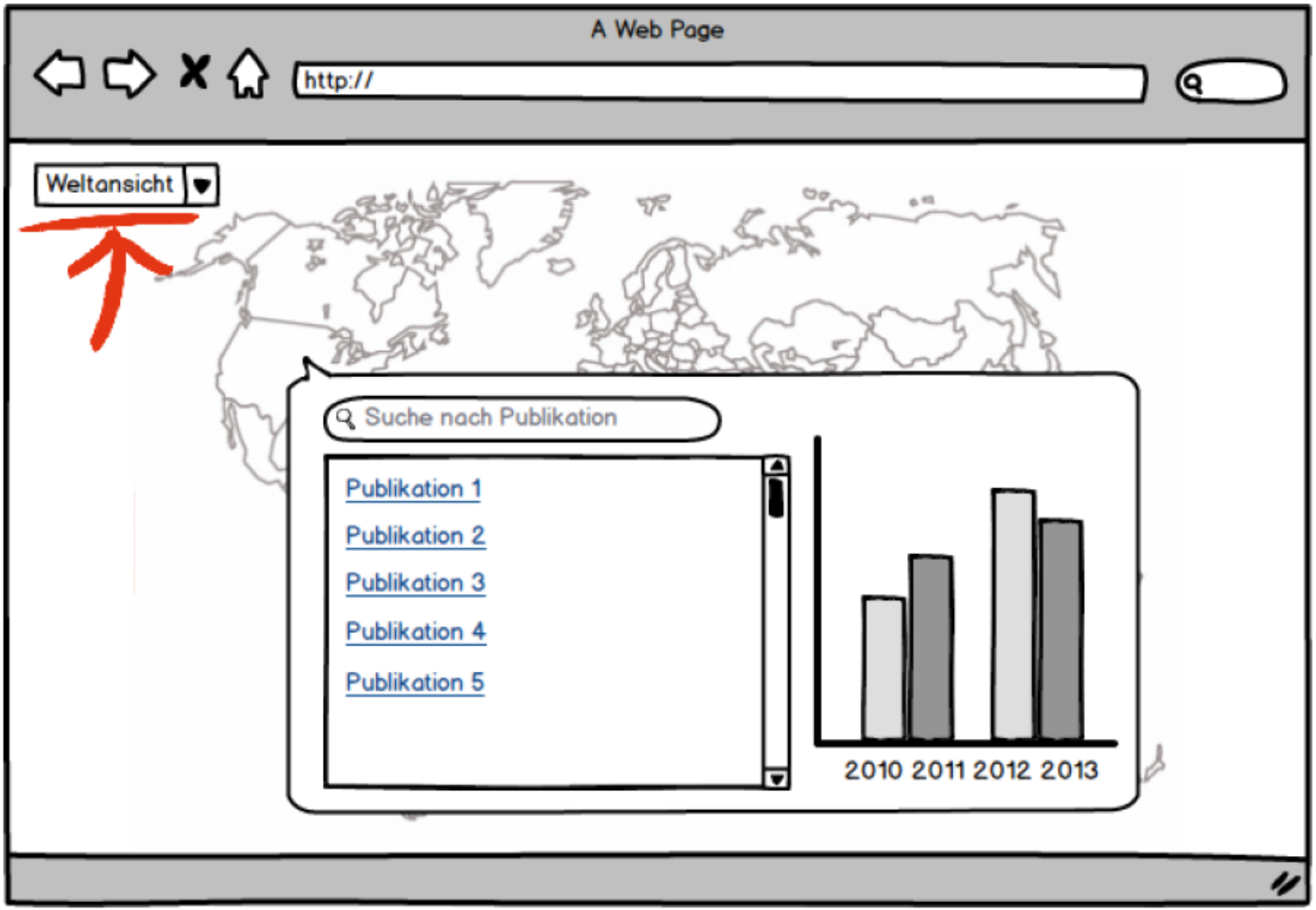
Konzeptbeispiel III (2P)



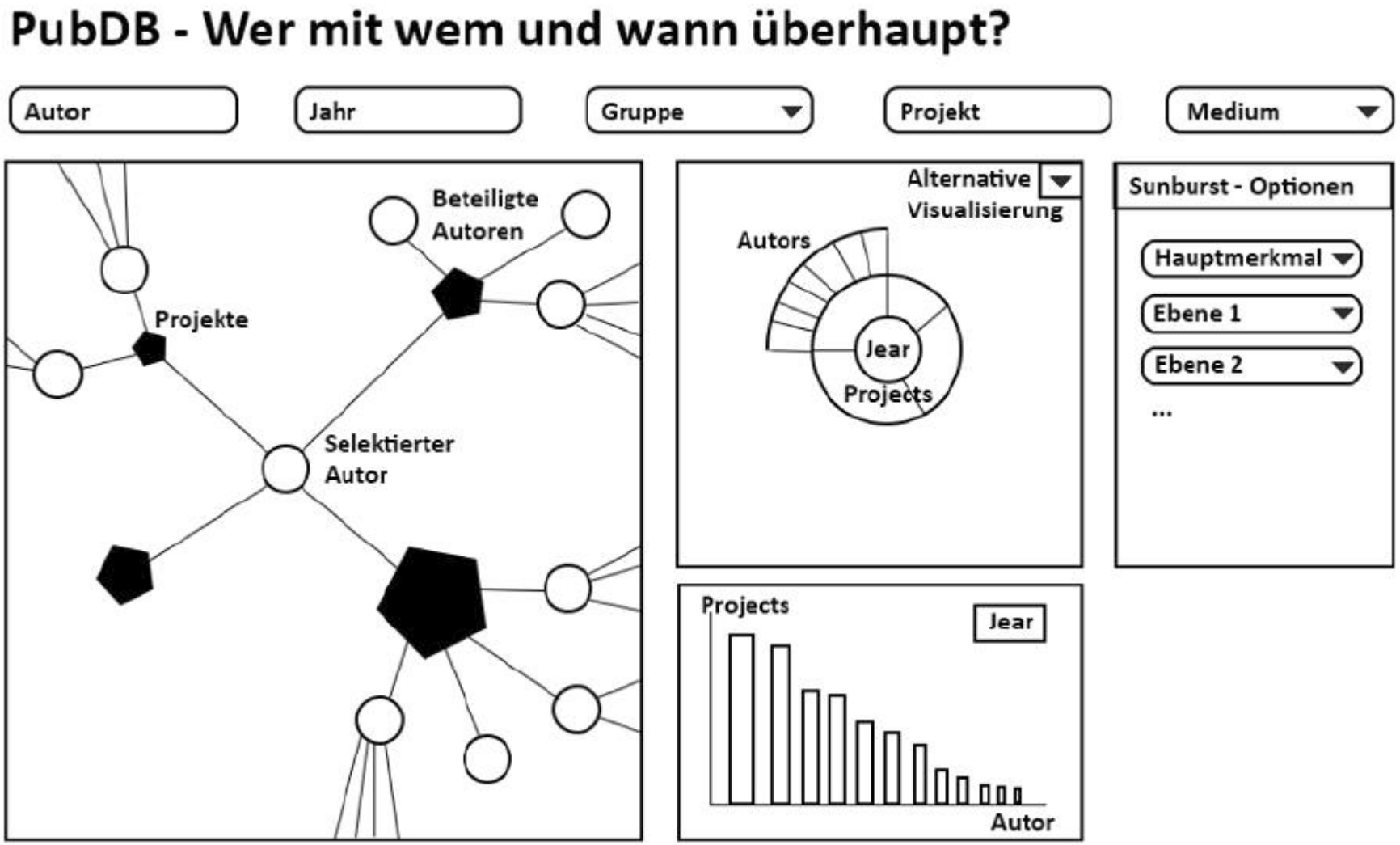
Konzeptbeispiel III (2P)



Konzeptbeispiel III (2P)



Konzeptbeispiel IV (2P)



PubDB: Q&A

- Projekt:
  - Stichworte des Papers

    Bspw. http://www.medien.ifi.lmu.de/cgi-bin/search.pl?all:all:all:**mobile**:all

- Gruppe:
  - Einzelne Forschungsgruppen. Ist nicht mehr relevant!

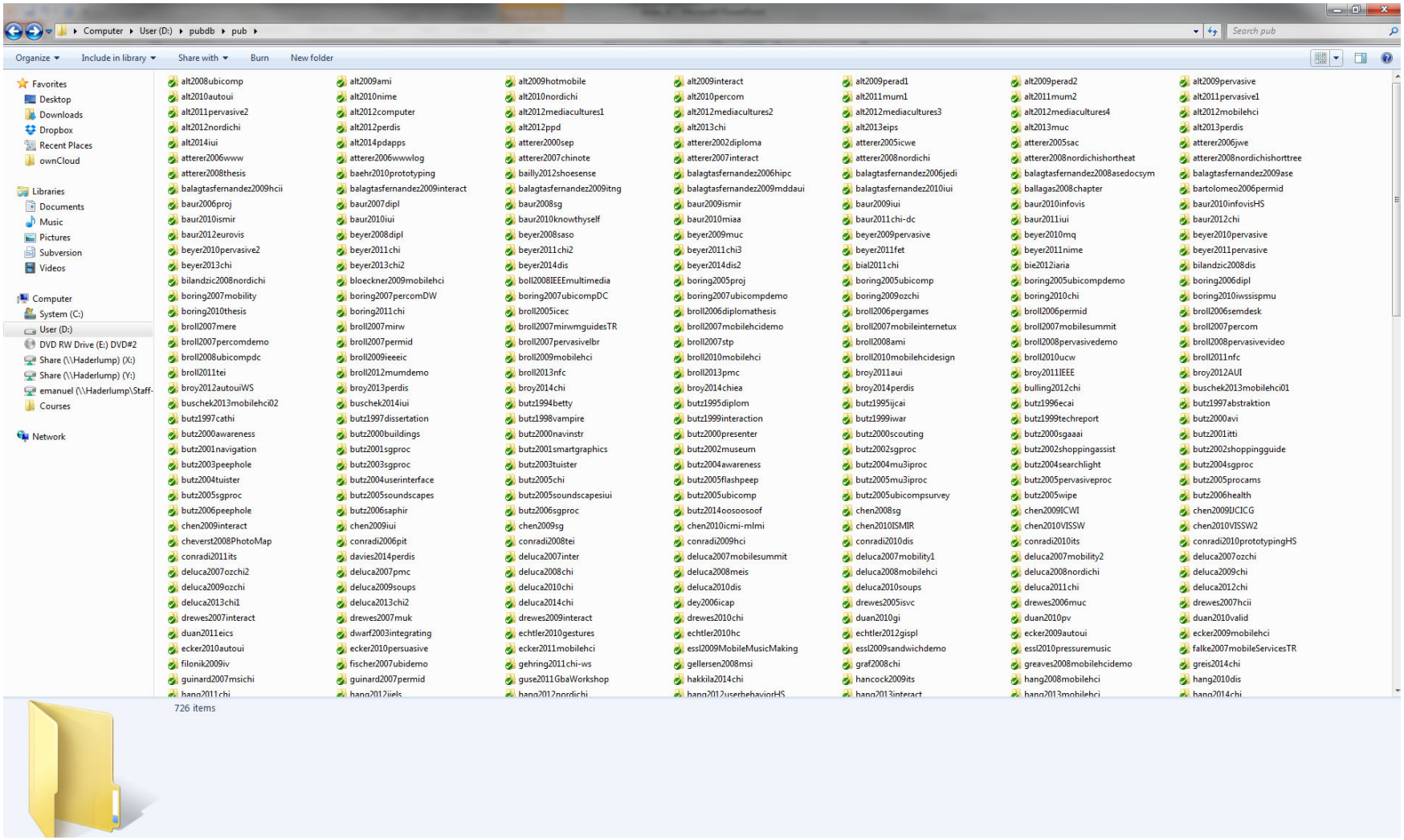
    Bspw. http://www.medien.ifi.lmu.de/cgi-bin/search.pl?all:all:fluidum:all:all

    (www.**fluidum**.org)

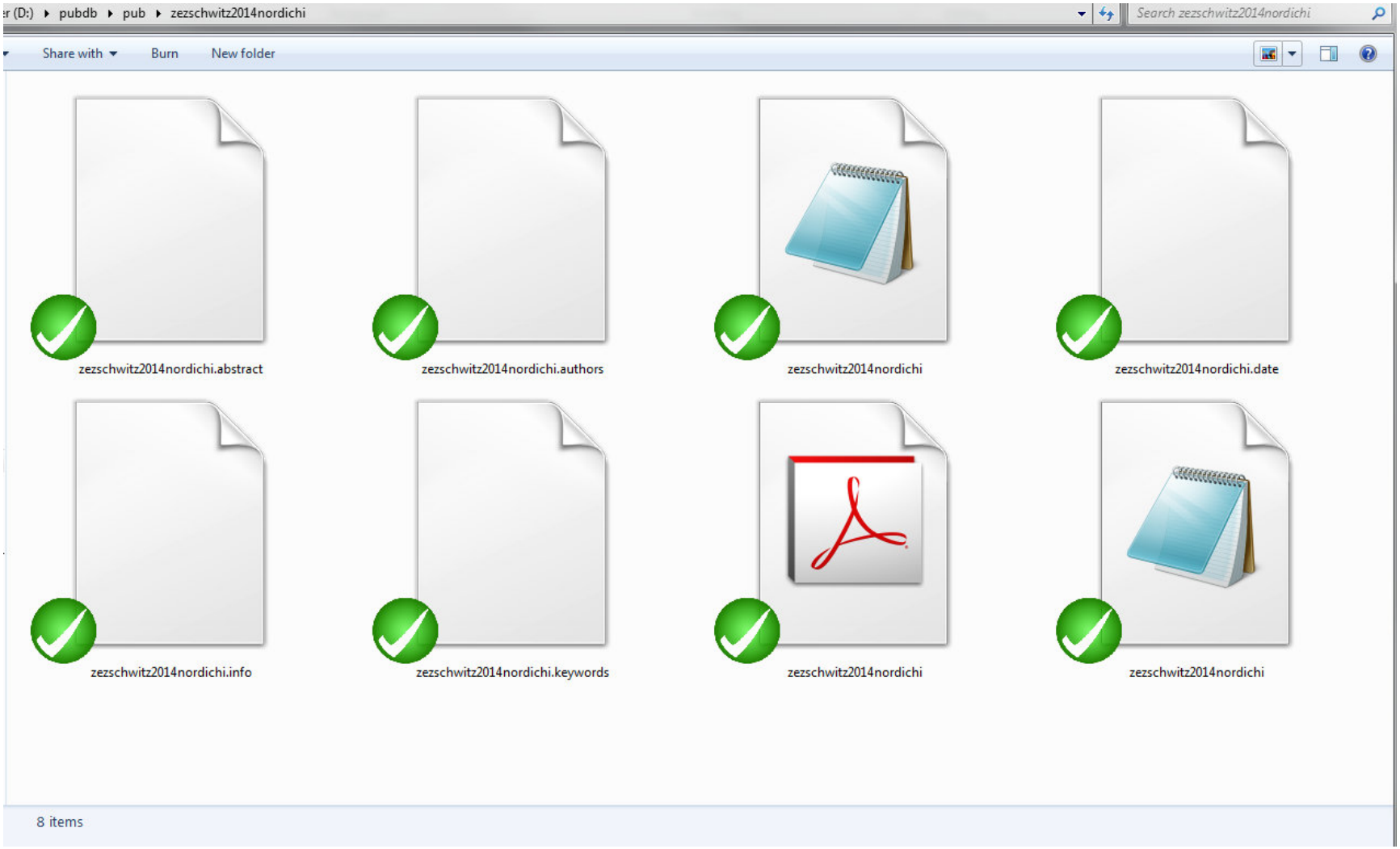
PubDB: Q&A

- Publikationsmedium:
  - Fast alle Publikationen finden auf Konferenzen statt.
  - Wenige Journalpapers
- Paperlänge:
  - Paperlänge wird häufig durch das Medium vorgegeben
- Konferenzort:
  - Die selbe Konferenzreihe findet in der Regel an verschiedenen Orten statt

PubDB: Structure

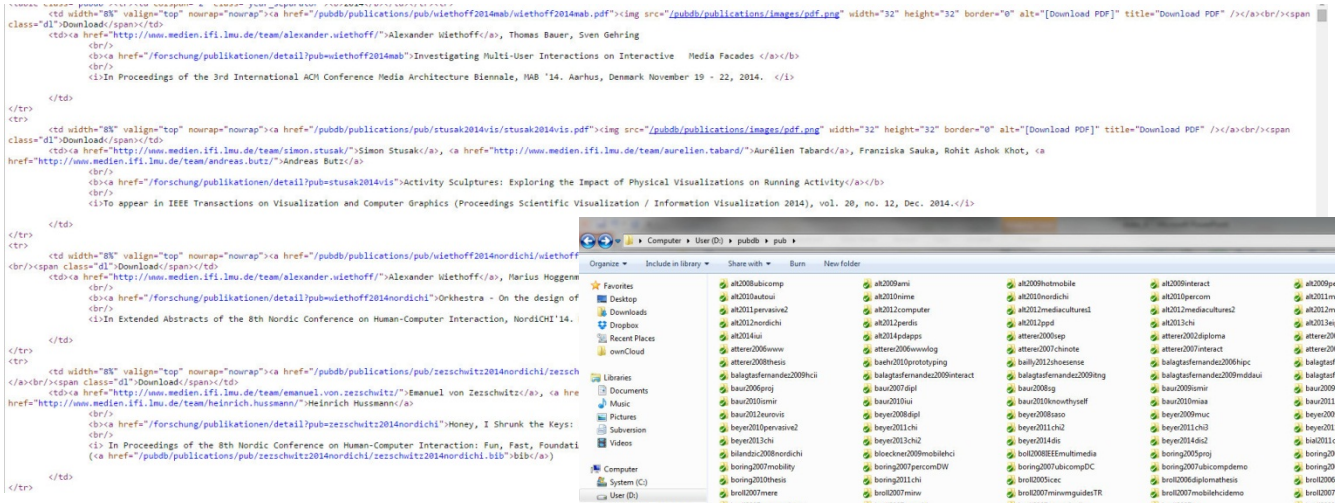


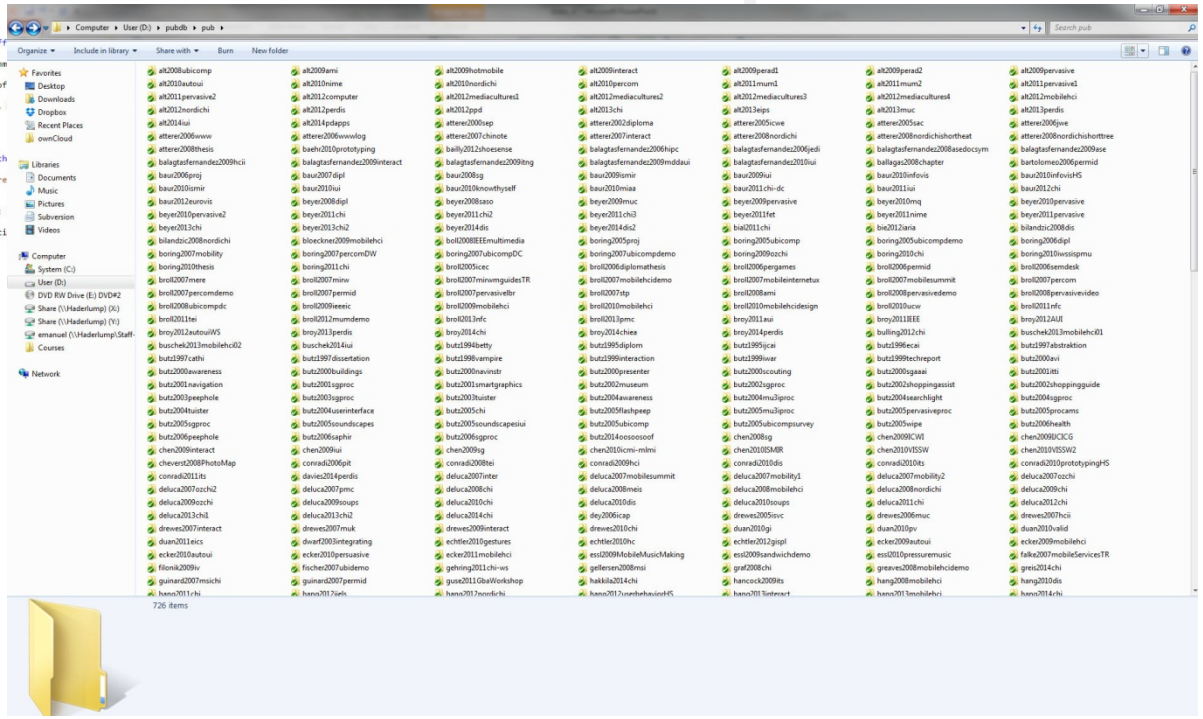
PubDB: Structure



PubDB: Datenaufbereitung

1. Parsen der HTML Ausgabe mit API Zugriff
2. Parsen der Textfiles

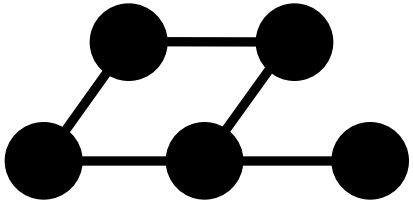


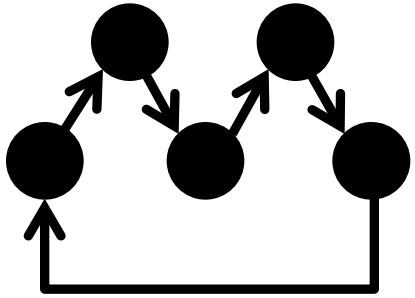


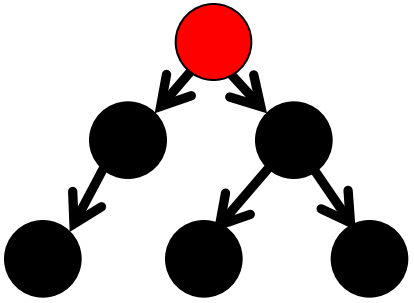
Graphs and Hierarchies

Terminology

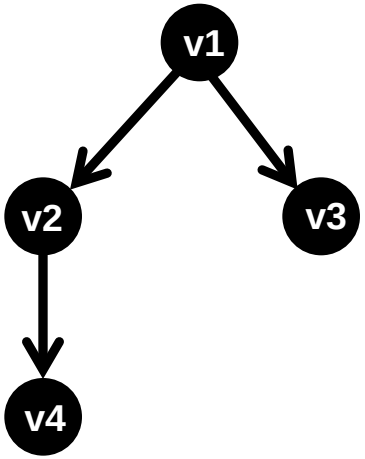
- A **Graph** is an abstract representation of a set of objects where relations between objects are represented by links.
- A **Network** is a directed graph.
- A **Tree** is a (usually) directed graph without cycles. There is usually a designated root.







Node-link versus Matrix



vs.

	v1	v2	v3	v4
v1	0	1	1	0
v2	0	0	0	1
v3	0	0	0	0
v4	0	0	0	0

Graph Drawing

Goals [2]:

- Minimize crossing
- Minimize area
- Minimize the sum of the edge lengths
- Obtain a uniform edge length
- Minimize bends

Paradigms [2]:

- Topology – Shape – Metrics
- Hierarchical
- Force – Directed

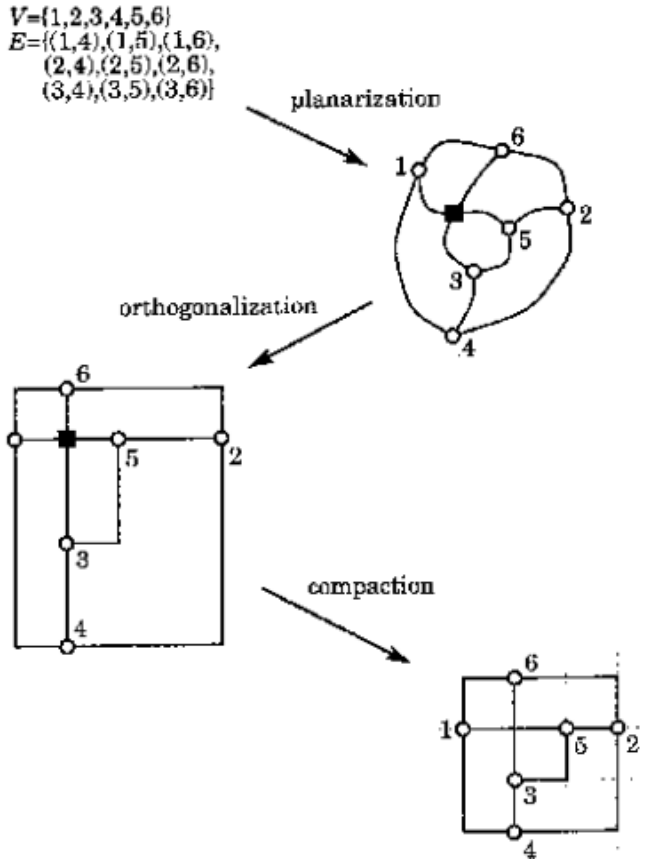
Graph Drawing

Topology – Shape – Metrics [2][4]:

- Draw orthogonal graphs

Approach:

- ✓ Planarization
- ✓ Dummy vertices for crossings
- ✓ Orthogonalization
- ✓ Minimize area



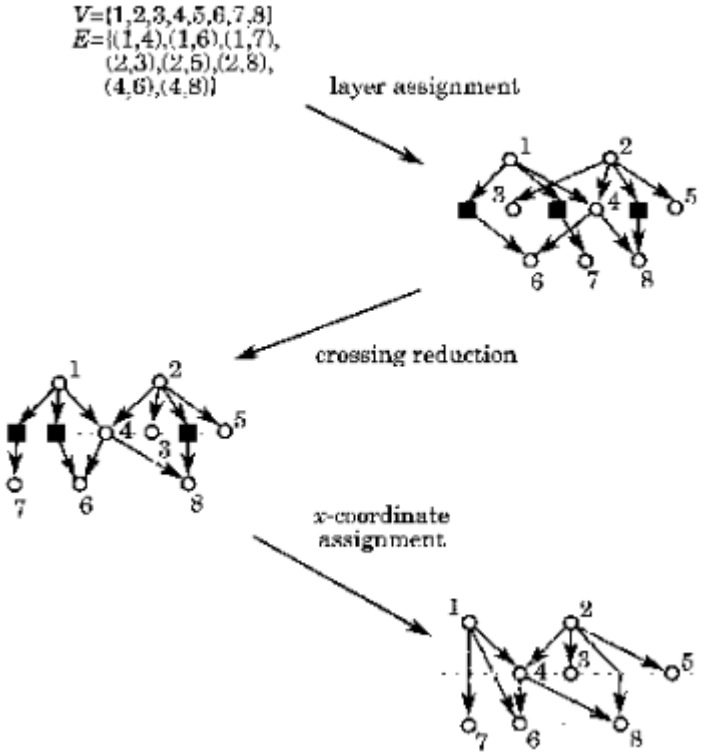
Graph Drawing

Hierarchical [2][4]:

- Draw hierarchical graphs

Approach:

- ✓ Layer assignment
- ✓ Dummy vertices for skipped layers (e.g. L_1 to L_3)
- ✓ Crossing reduction
- ✓ X-coordinate assignment



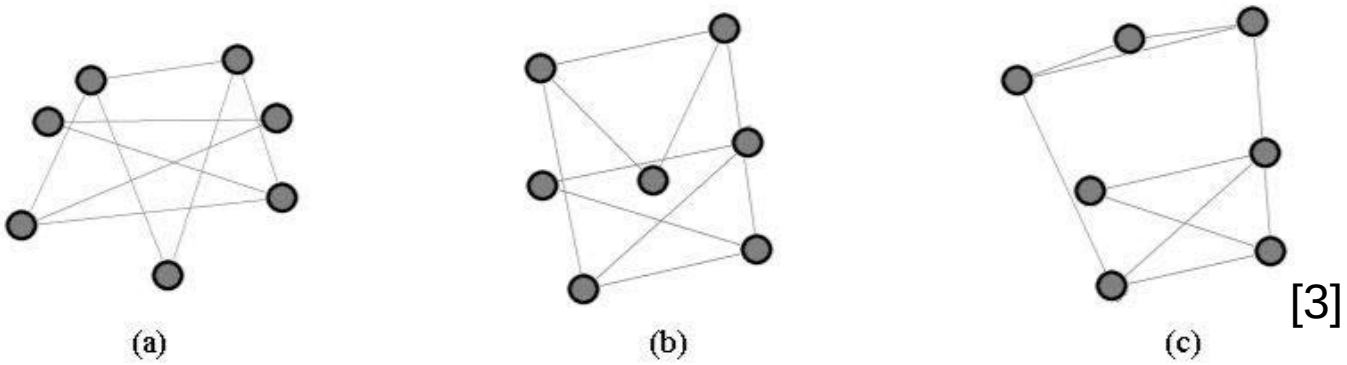
Graph Drawing

Force – Directed (Spring Algorithm) [2][4]:

- Draw self-organizational graphs

Approach:

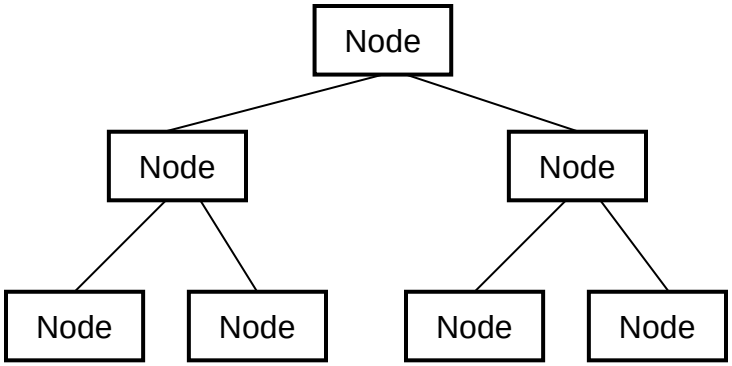
- ✓ Nodes have forces (e.g. electrical repulsion)
- ✓ Edges have forces (e.g. gravitational attraction)
- ✓ Friction to stop the process



[3]

Node-Link vs. Enclosure

- Immediate perception of relations
- Waste of screen real estate



- Space-filling
- Focus on leaf nodes
- Structure gets lost

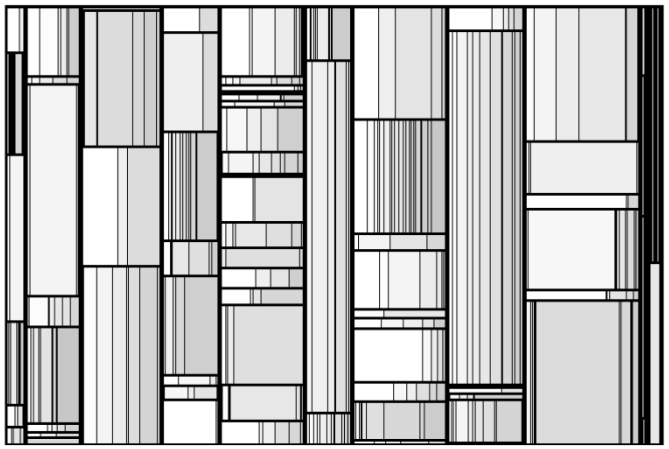
http://newsmap.jp/

Treemap Algorithms [1]

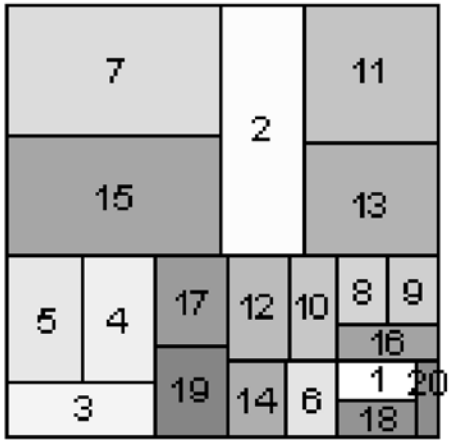
- **Slice-and-Dice**
- Cluster
- Squarified

- Bewertung durch: *Aspect Ratio, Change, Readability*

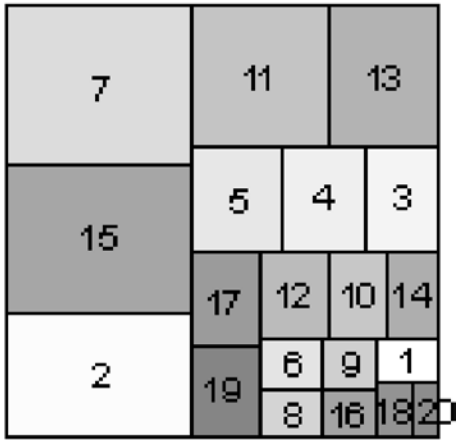
Slice-and-Dice



Cluster

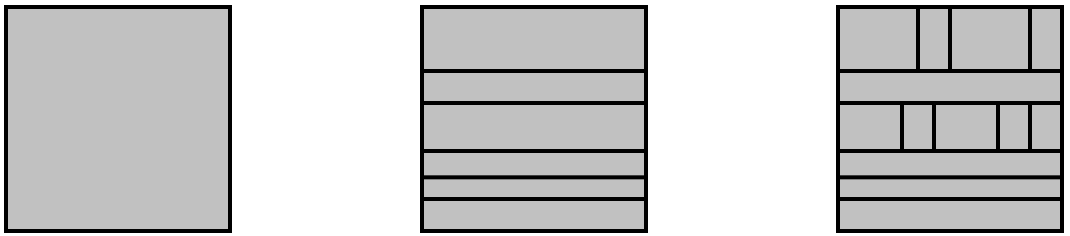


Squarified



Slice-and-Dice

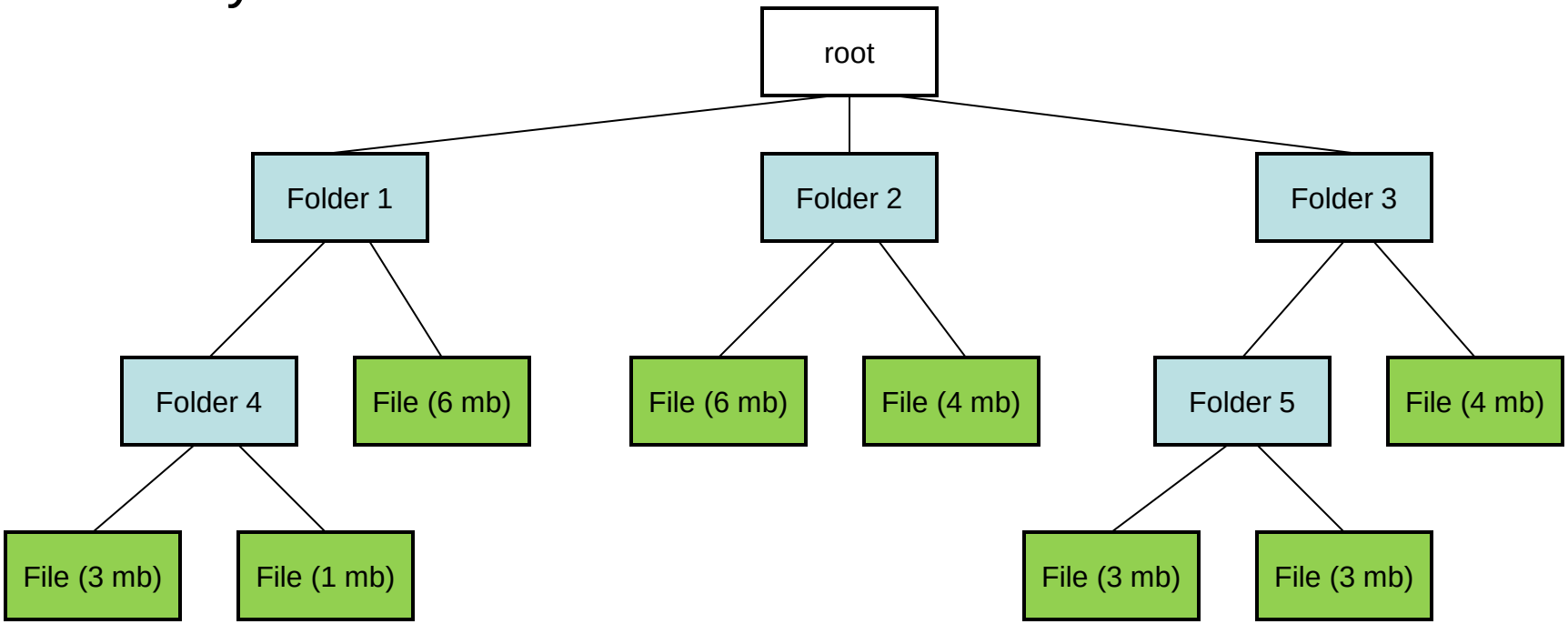
- Algorithm:
  - Use parallel lines to divide a rectangle representing an item into smaller rectangles representing the item's children
  - Each child is allocated a size proportional to some property (additional encoding by color)
  - At each level of the hierarchy switch the orientation of the lines (vertical vs. horizontal)



1. 2. 3.

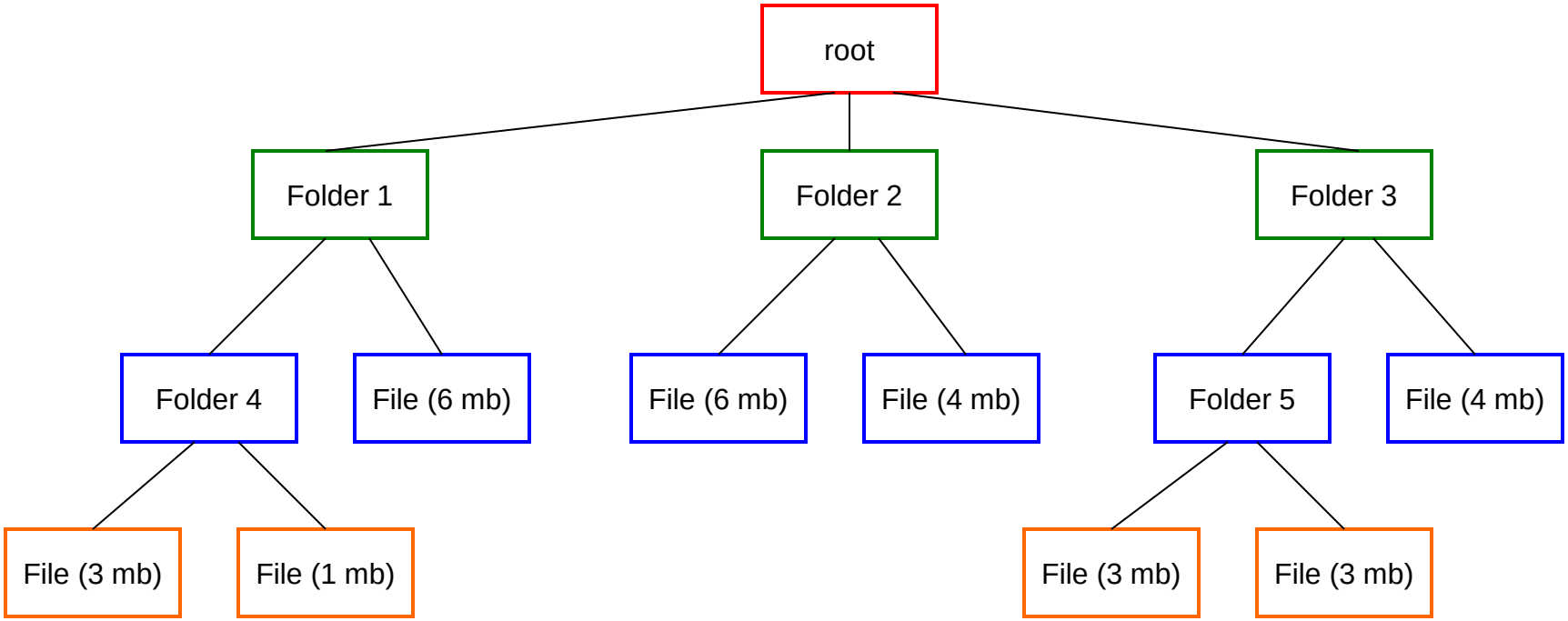
Slice and Dice

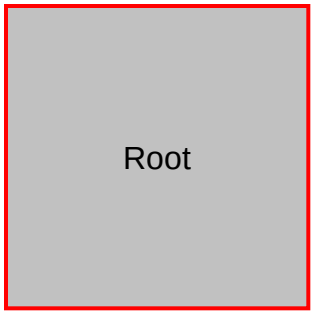
- Filesystem:

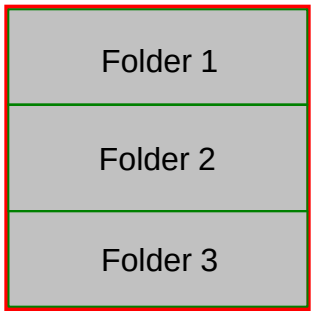


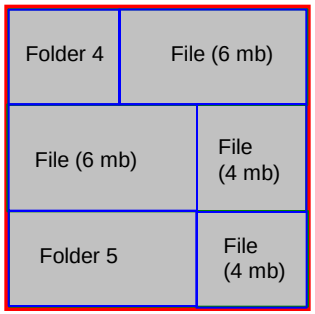
Slice and Dice

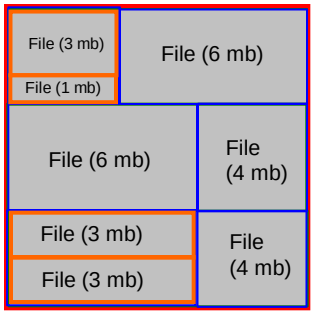
- Solution:





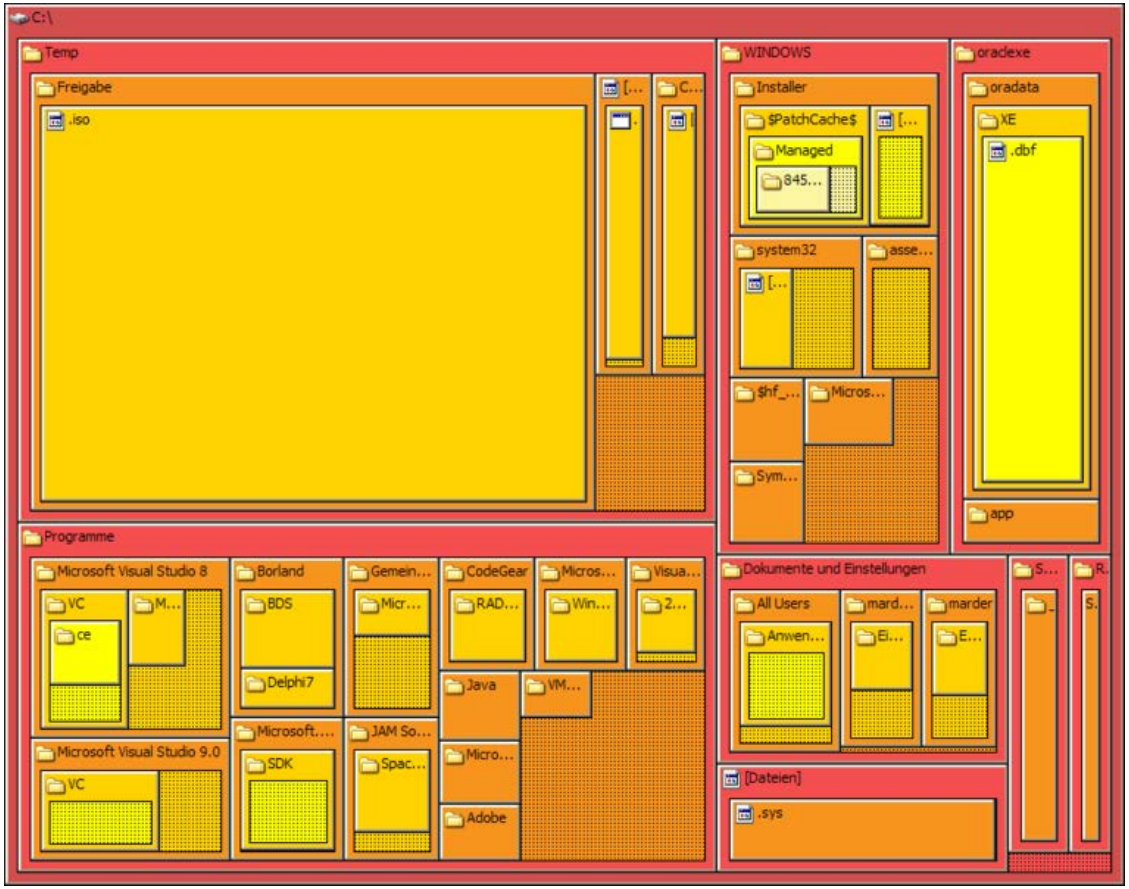






Nested Treemap

- Revealing the tree structure (to a certain degree)



© Carnivore1973 (from: wikipedia.org)

Subtree Selection

- Navigate the structure
- Easy access to subtrees
- Still no insights into the overall topology

PubDB: Roadmap

- **Milestone: 08.01.2015 – 14:00 Uhr**

- **Deadline: 22.01.2015 – 14:00 Uhr**
- **Abgabe**:
  - Abgabe der Erkenntnisse über UniWorX
  - Demos in den Übungen
    - Wer hat was gemacht?
    - Was wurde umgesetzt?
    - Was wurde aus den Daten abgeleitet?

- Notifikation über Notenbonus bis zum 03.02.2015 per E-Mail.

References

[1] Benjamin B. Bederson, Ben Shneiderman, and Martin Wattenberg. 2002. Ordered and quantum treemaps: Making effective use of 2D space to display hierarchies. *ACM Trans. Graph.* 21, 4 (October 2002)

[2] Di Battista, G. , Eades, P., Tamassia, R., Tollis, I., Graph Drawing: Algorithms for the Visualization of Graphs, Prentice Hall, Upper Saddle River, 1999

[3] Dominikus Baur, Frederik Seiffert, Michael Sedlmair, and Sebastian Boring. 2010. The Streams of Our Lives: Visualizing Listening Histories in Context. *IEEE Transactions on Visualization and Computer Graphics* 16, 6 (November 2010), 1119-1128.

[4] Germano, T. Graph Drawing. 1999. http://davis.wpi.edu/~matt/courses/graphs/, last visited:26.11.2012

[5] Jian Zhao, Fanny Chevalier, and Ravin Balakrishnan. 2011. KronoMiner: using multi-foci navigation for the visual exploration of time-series data. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '11). ACM, New York, NY, USA, 1737-1746.

[6] Wolfgang Müller and Heidrun Schumann. 2003. Visualization for modeling and simulation: visualization methods for time-dependent data - an overview. In Proceedings of the 35th conference on Winter simulation: driving innovation (WSC '03). Winter Simulation Conference 737-745.