



Network Visualization: Successful Case Studies

Ben Shneiderman, Aleks Aris & Adam Perer

{ben, aris, adamp}@cs.umd.edu

Human-Computer Interaction Lab &
Dept of Computer Science



UNIVERSITY OF
MARYLAND



State-of-the-art network visualization

visualcomplexity
Support UC:

Home | About | Discussion | Books | Links | Feedback

Process Mapping
MS Visio Process Library solutions with web-enabled keyword search
Ads by Goooooogle

IMAGES

Node Placement Methods



- Node-link diagrams
 - Force-directed layout
 - Geographical map
 - Circular layout
 - Temporal layout
 - Clustering
 - Layouts based on node attributes
- Matrix-based
- Tabular textual

Node Placement Methods

- Node-link diagrams
 - Force-directed layout
 - Geographical map
 - Circular layout
 - Temporal layout
 - Clustering
 - Layouts based on node attributes
- Matrix-based
- Tabular textual

Node Placement Methods

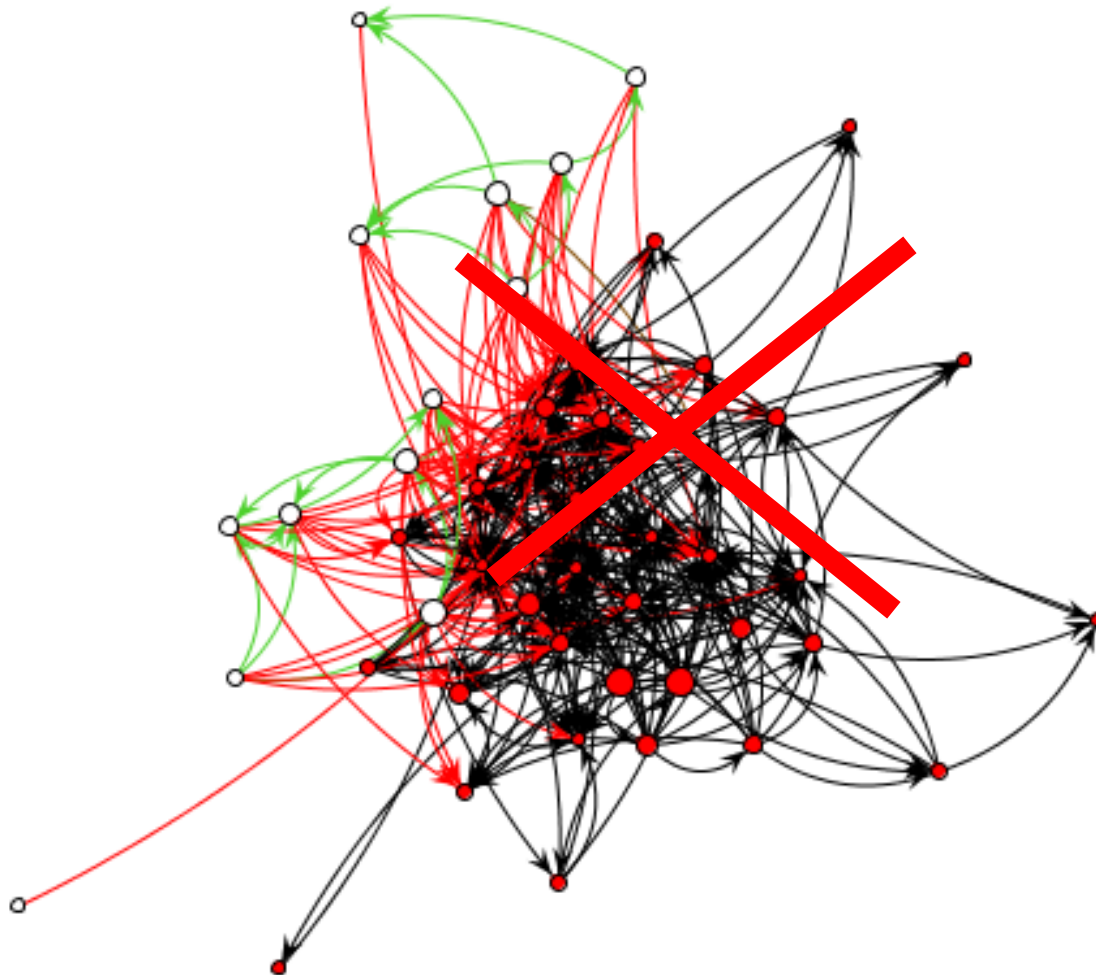
- Node-link diagrams
 - Force-directed layout
 - Geographical map
 - Circular layout
 - Temporal layout
 - Clustering
 - Layouts based on node attributes
- Matrix-based
- Tabular textual

1) NVSS: Semantic Substrates

- Group nodes into regions
 - According to an attribute
 - Categorical, ordinal, or binned numerical
- In each region:
 - Place nodes according to other attribute(s)
- Give users control of link visibility

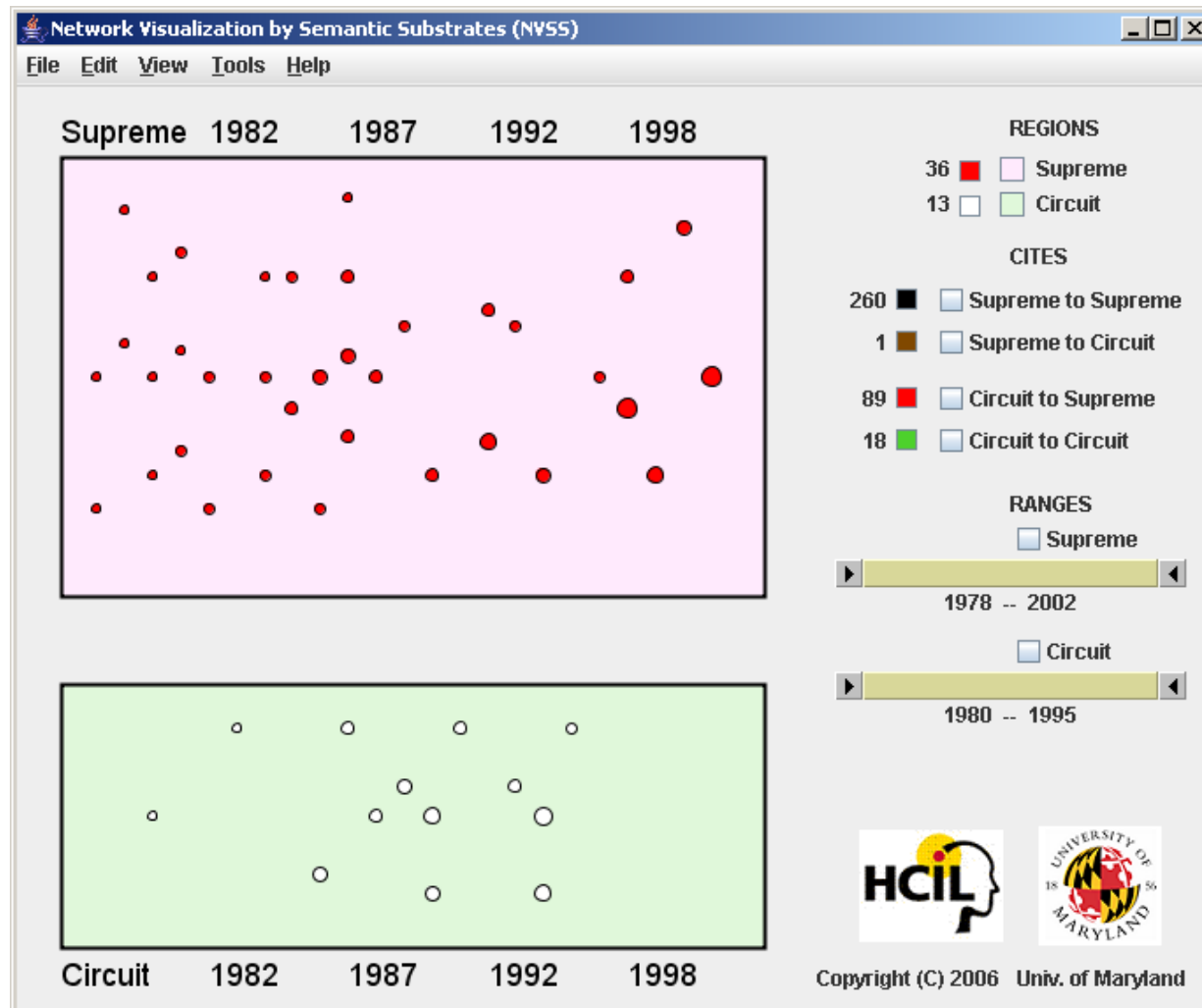
Force Directed Layout

36 • Supreme & 13 • Circuit Court decisions
268 Citations on Regulatory Takings 1978-2002

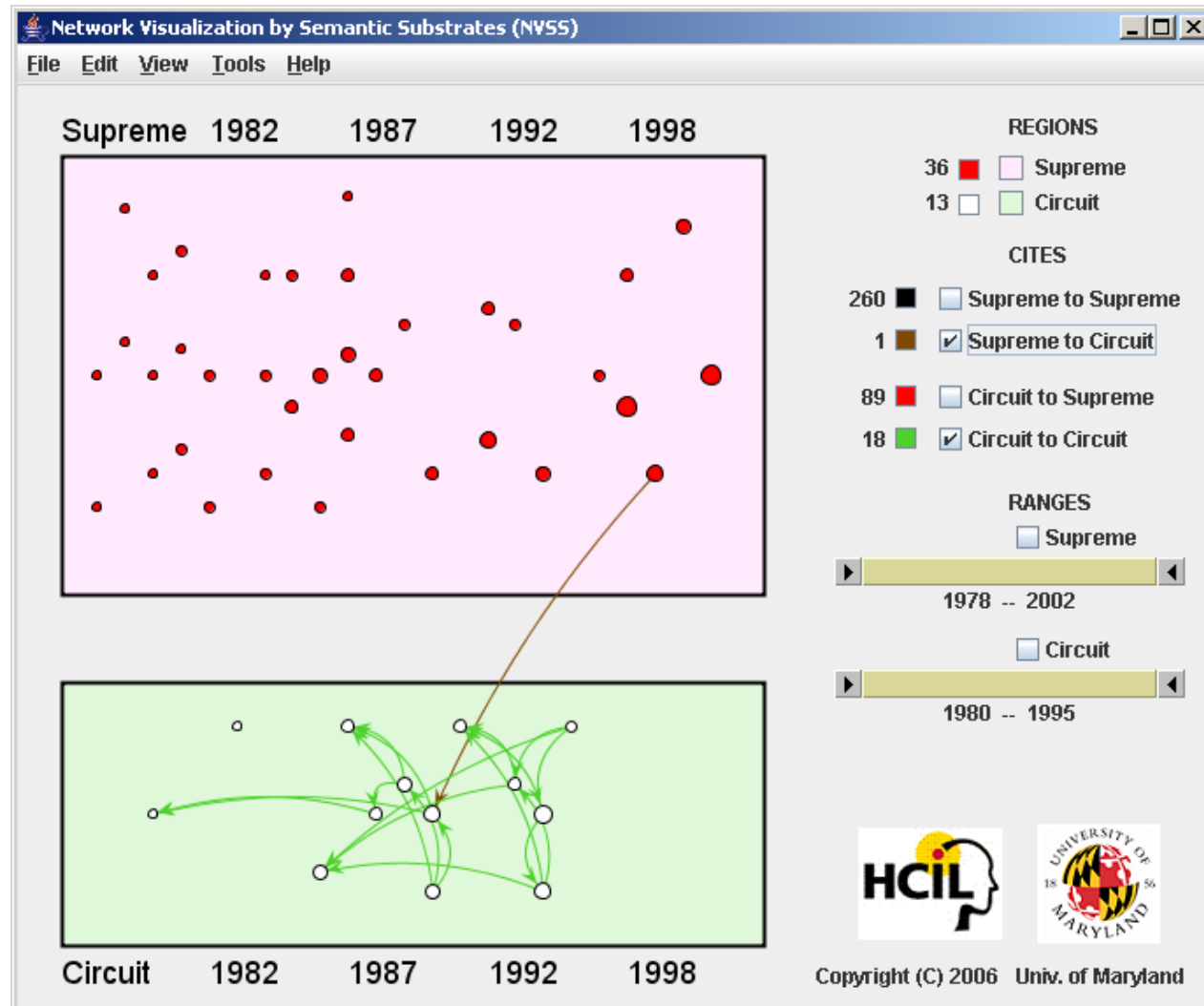


Network Visualization by Semantic Substrates

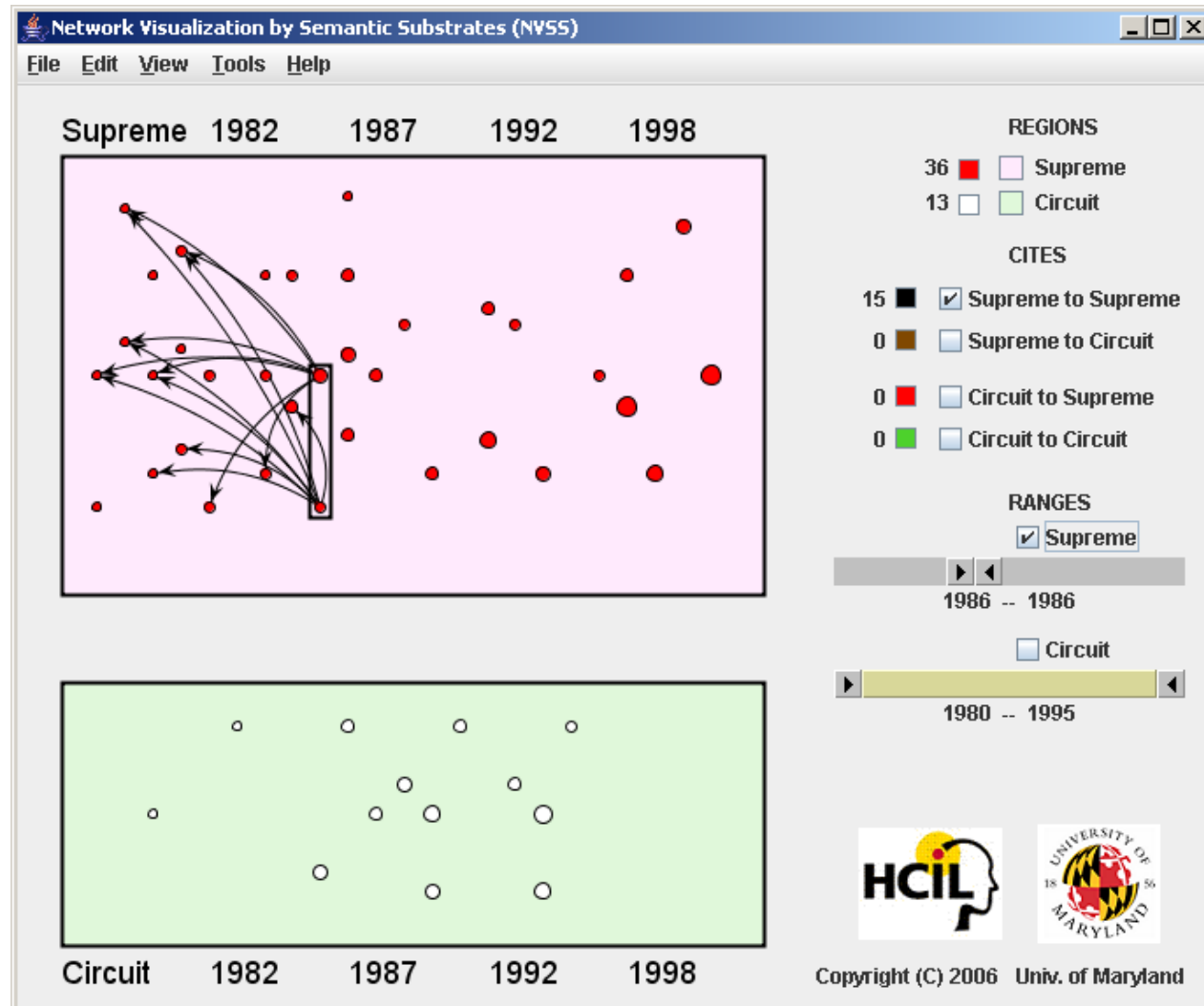
NVSS 1.0



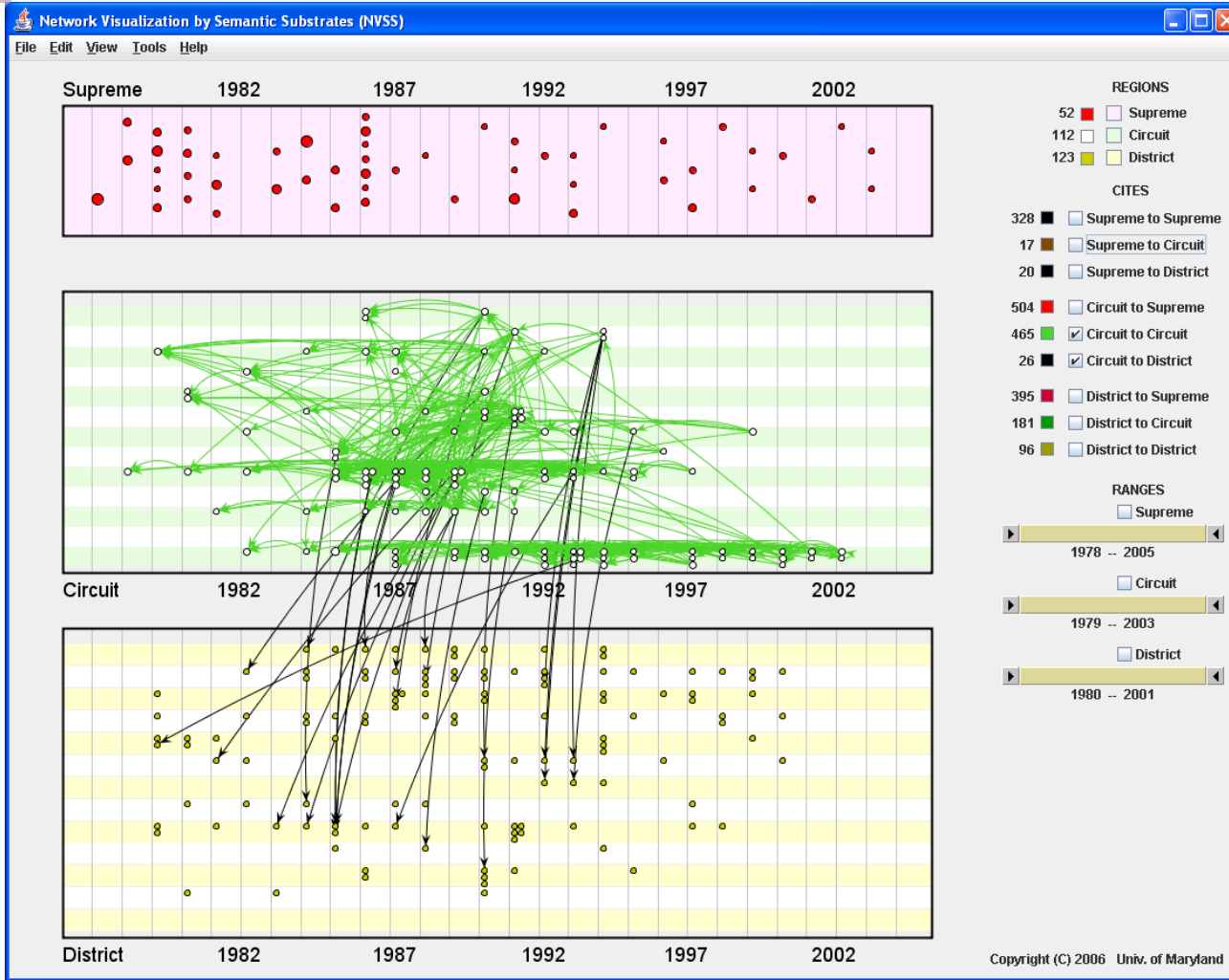
Filtering links by source-target



Filtering links by time attribute (1)



Network Visualization by Semantic Substrates

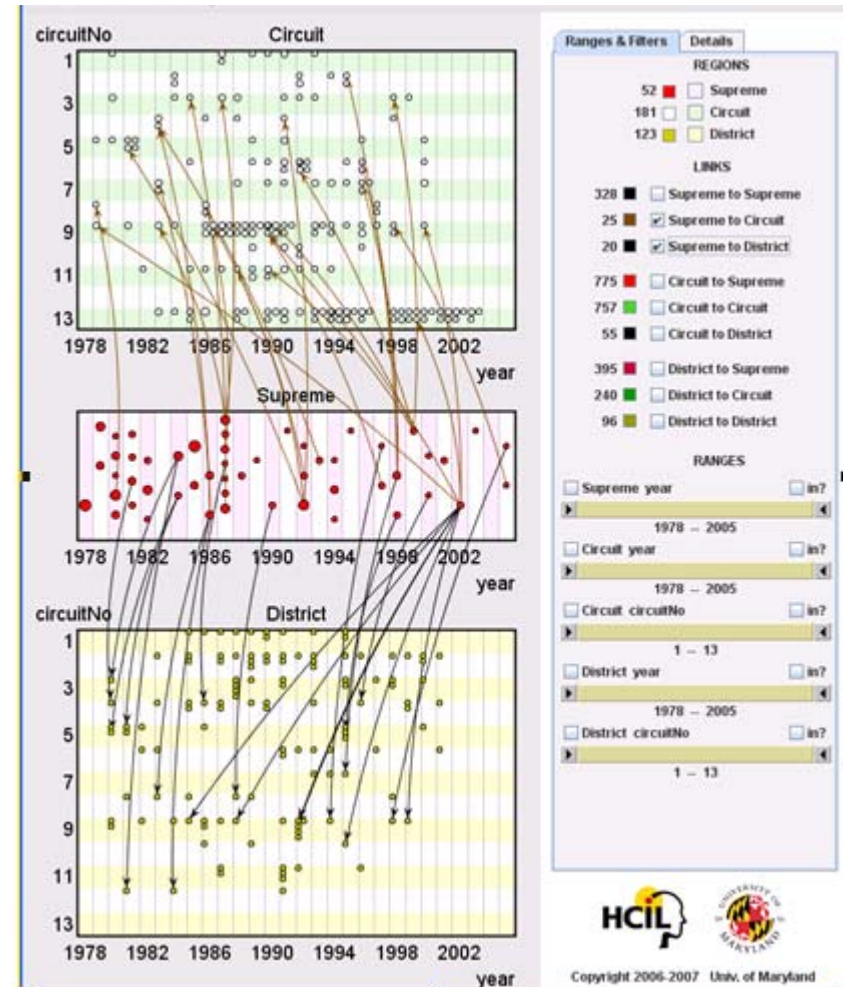
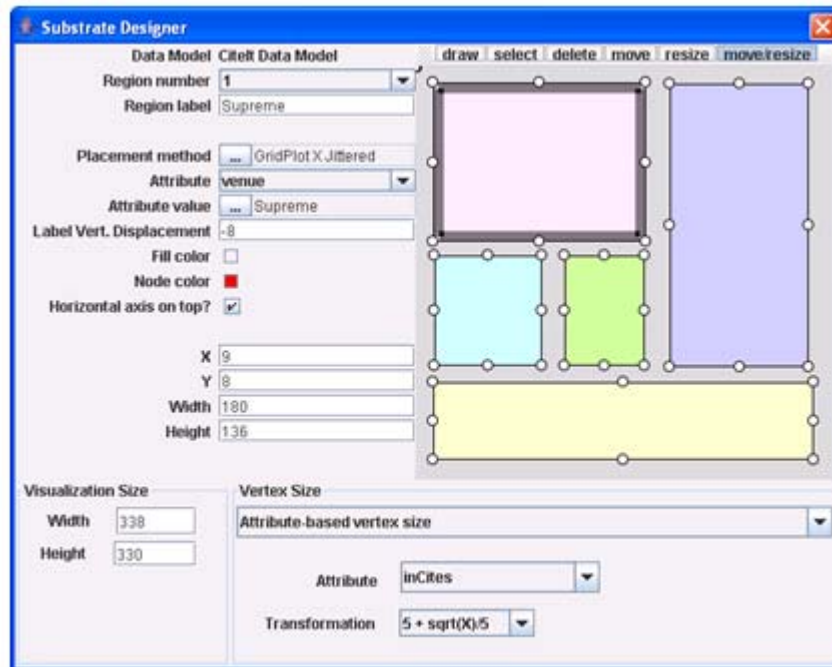


- Meaningful layout of nodes
- User controlled visibility of links
- Cross refs in 11 Circuit Courts (green) + few refs to District Court cases

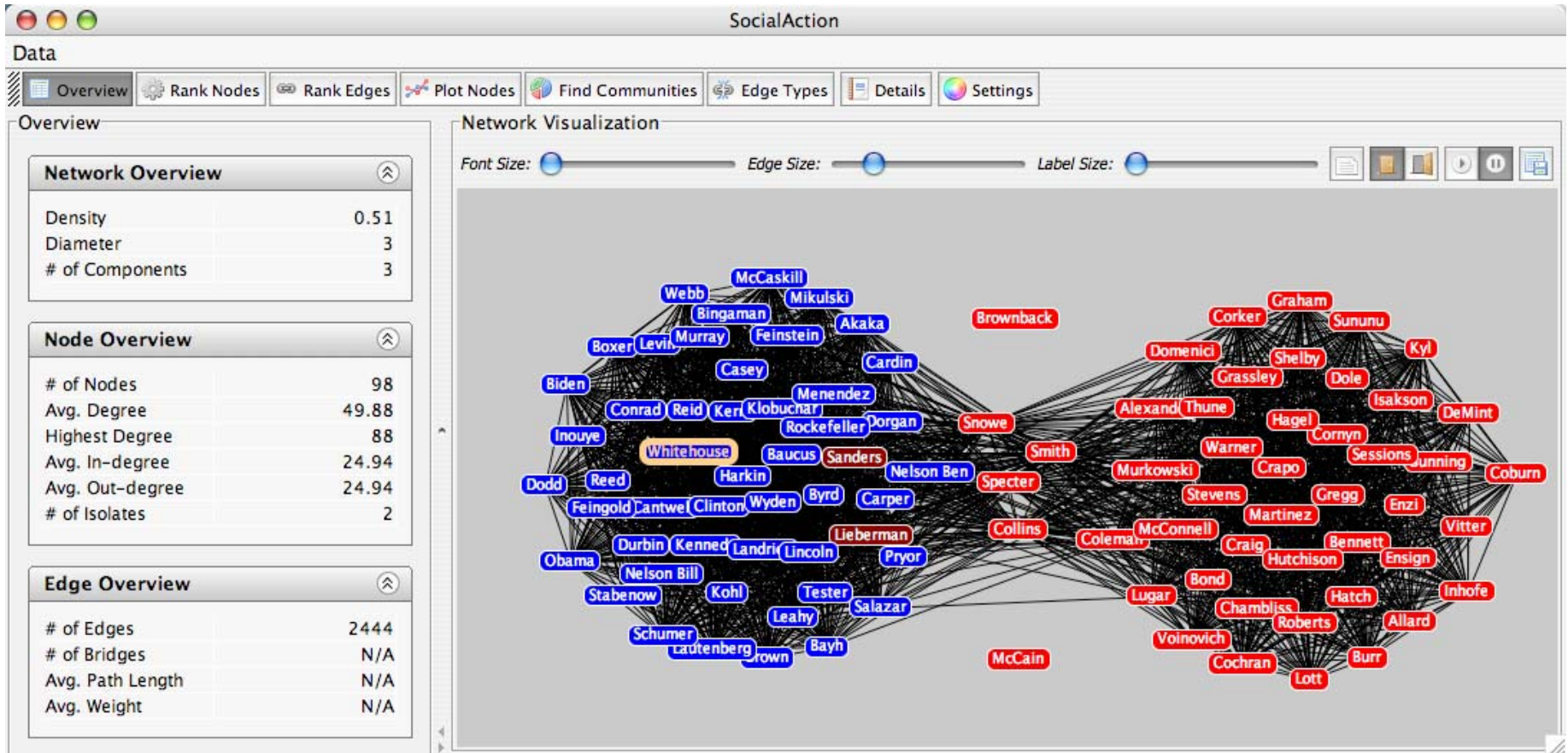
Network Visualization by Semantic Substrates

NVSS 2.0

with Substrate Designer

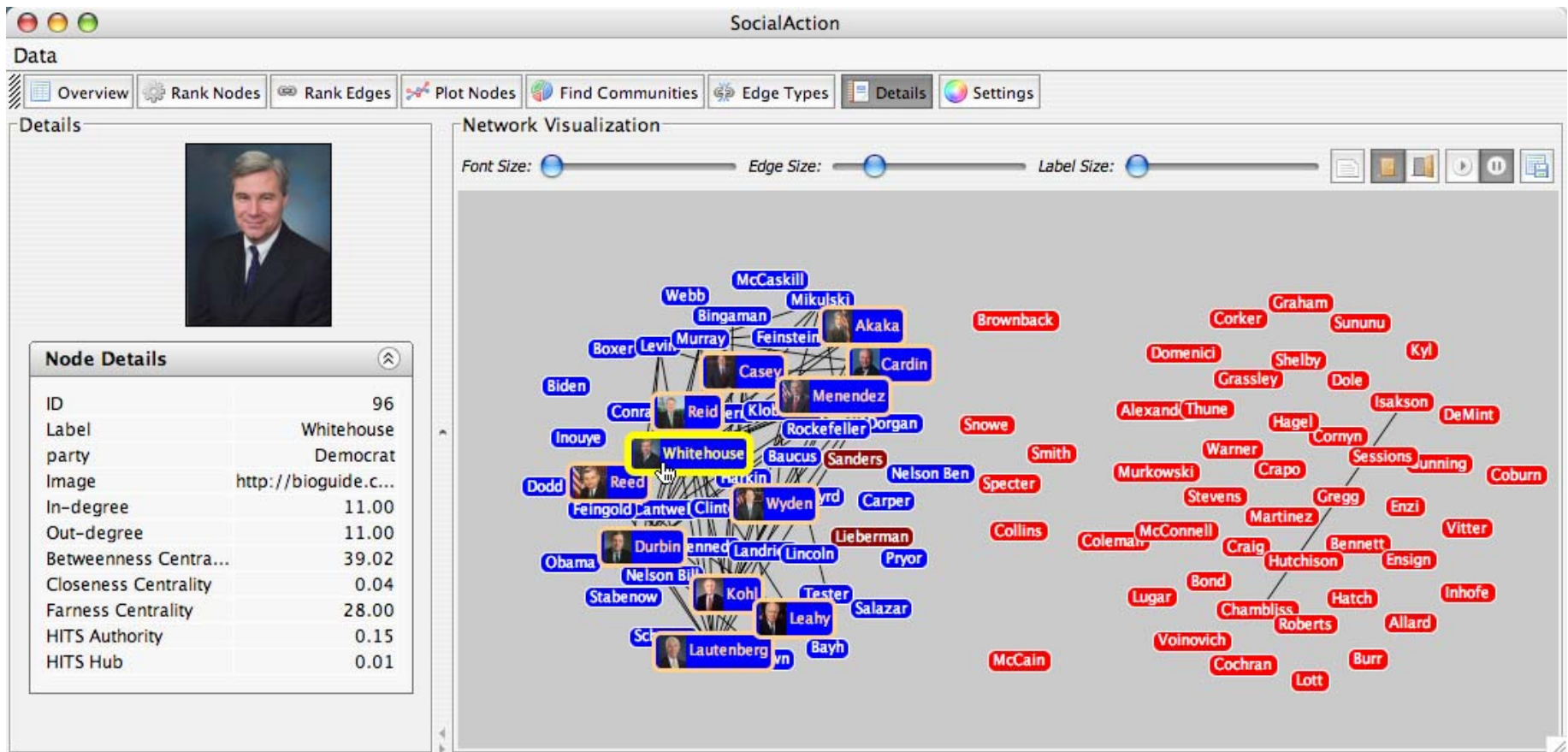


Senate 2007: 180 out of 310 Votes in Common

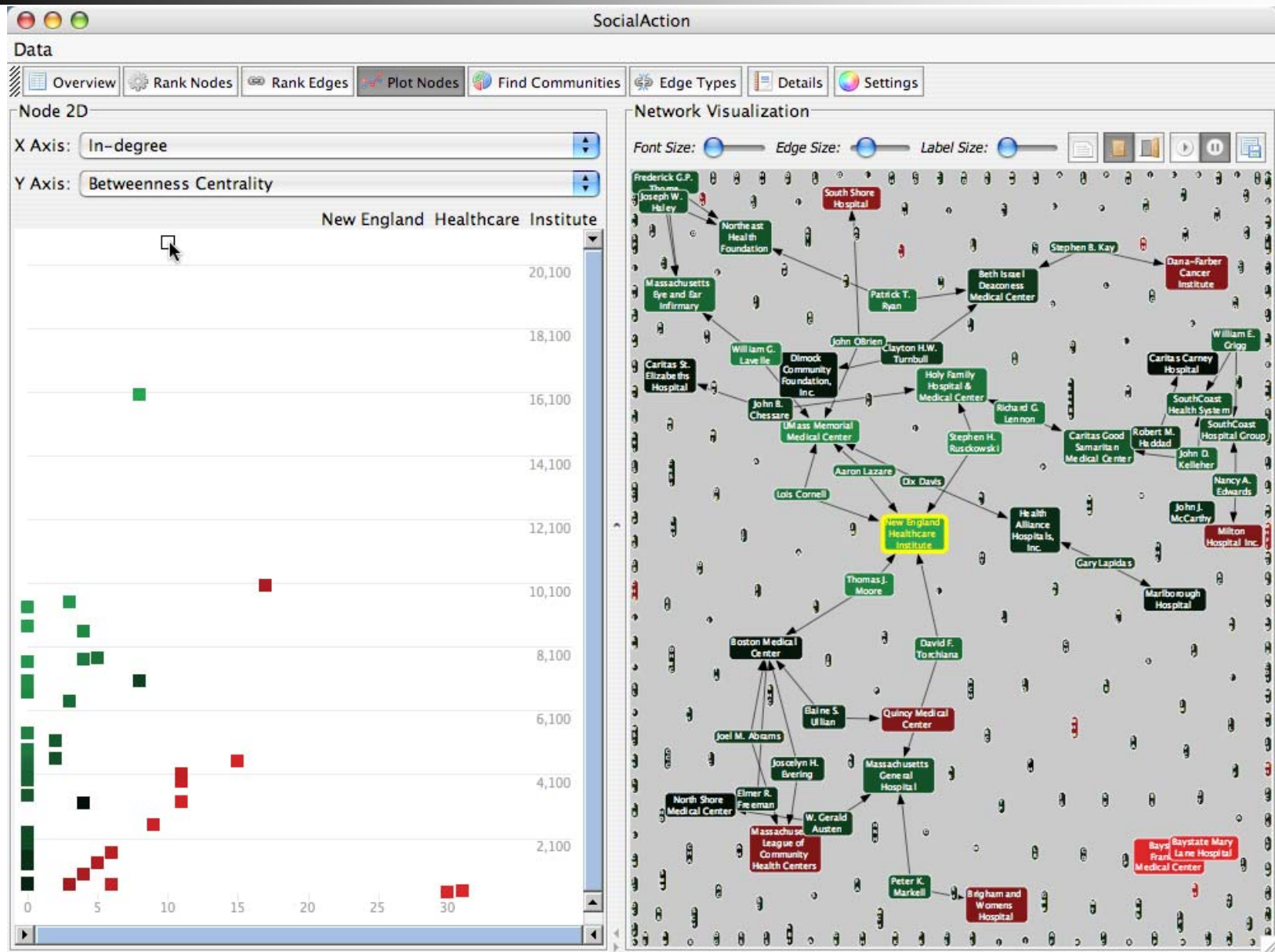


Social Action: 2007 Senate Votes

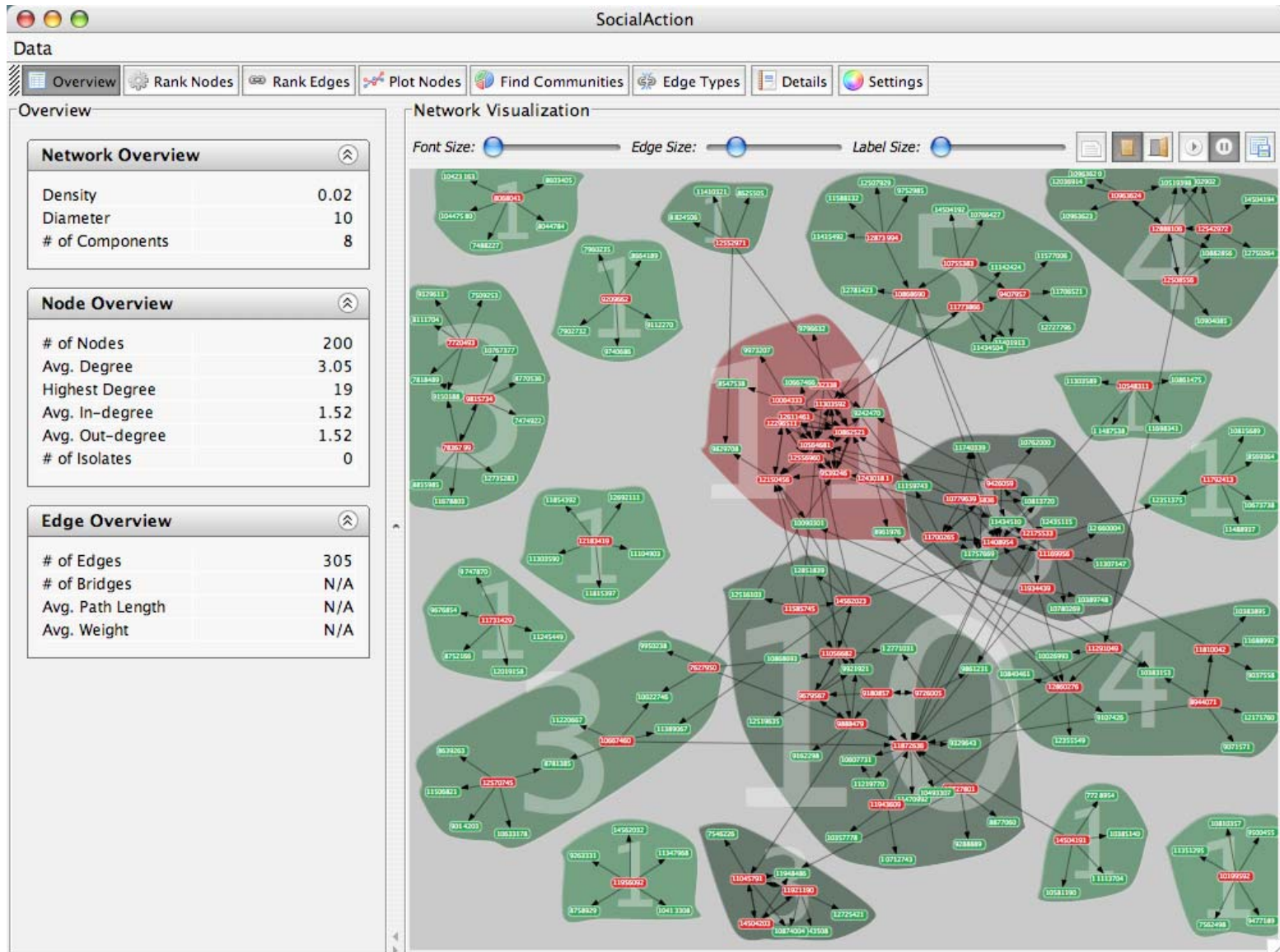
290 out of 310 Votes in Common



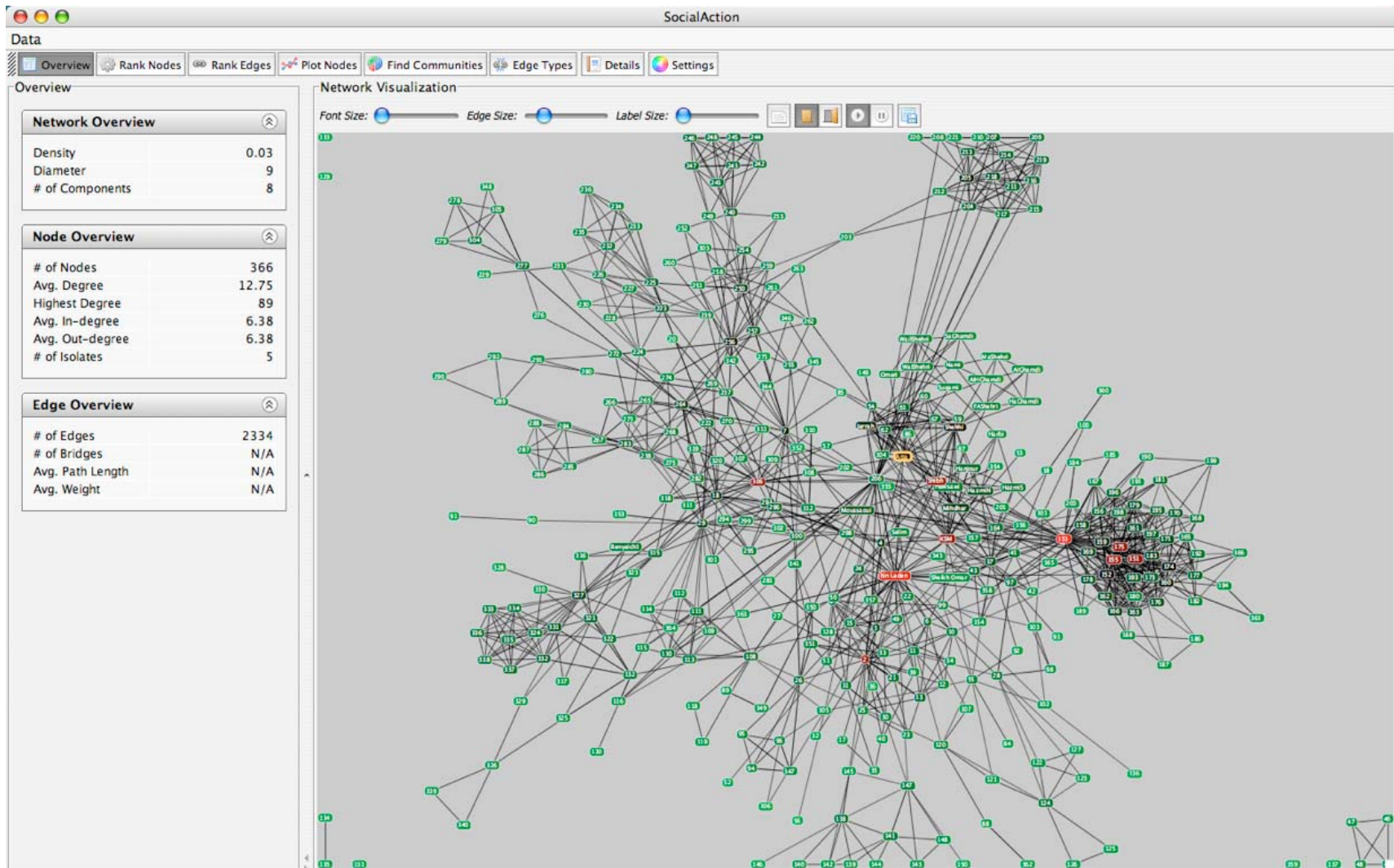
Social Action: HealthCare Directors



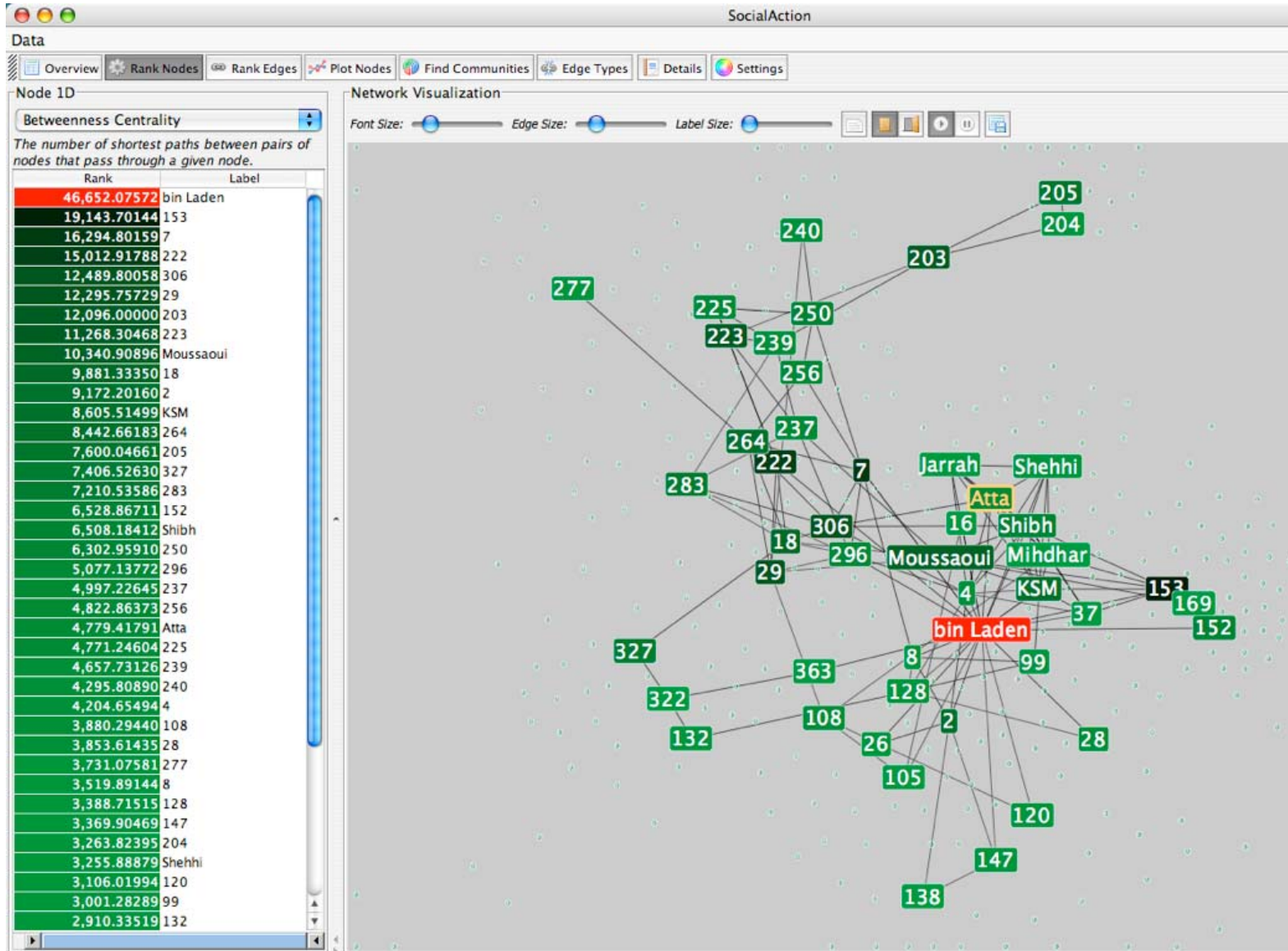
Social Action: PubMed related refs



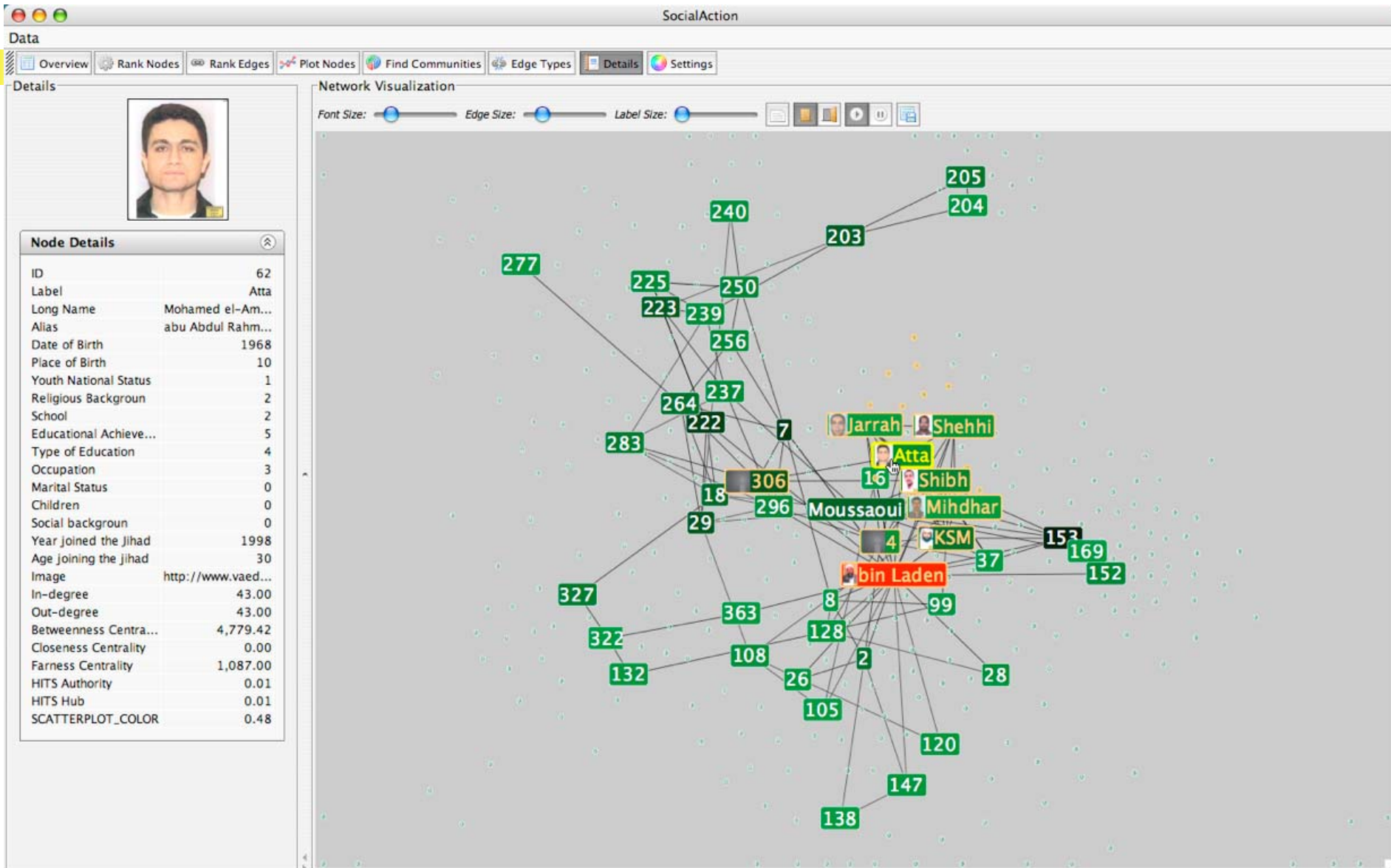
SocialAction: Overview of Global Jihad Network



Filtering by Betweenness (“Gatekeepers”)



Details on Demand (Mohamed Atta)



Evaluation Method



Ethnographic Observational Situated

- Multi-Dimensional
- In-depth
- Long-term
- Case studies

Evaluation Methods

Ethnographic Observational Situated

- Multi-Dimensional
- In-depth
- Long-term
- Case studies

Domain Experts & Communities
Doing Their Own Work
for Weeks & Months

Evaluation Methods



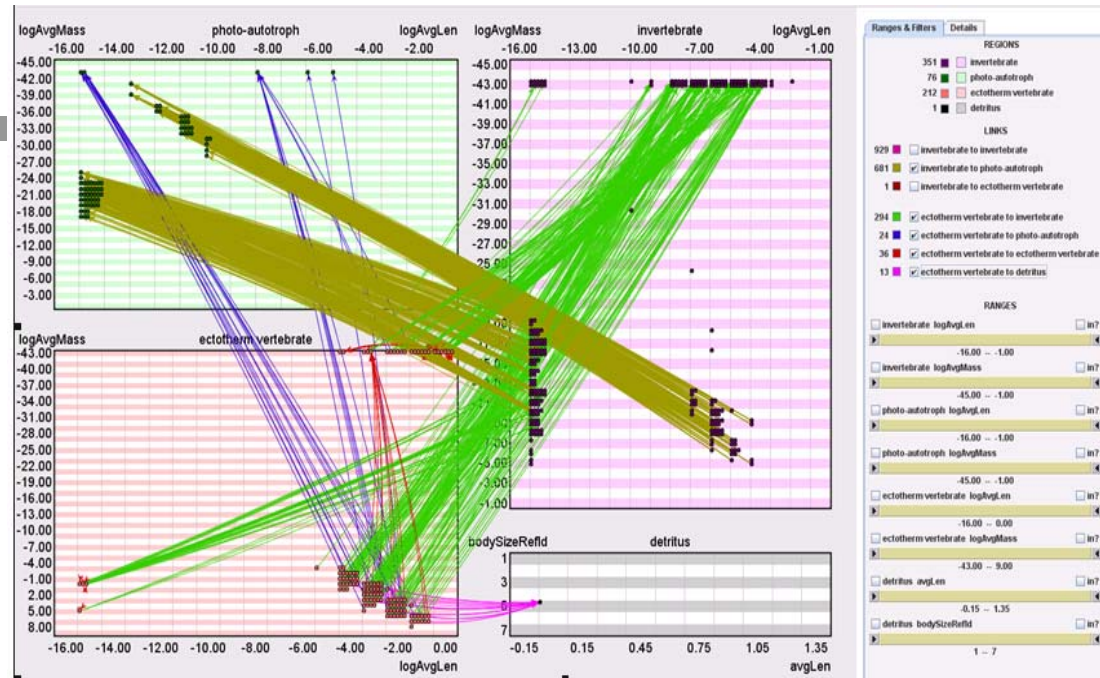
Ethnographic Observational Situated

- Multi-Dimensional
- In-depth
- Long-term
- Case studies

MILCs

MILC example

- Evaluate NVSS

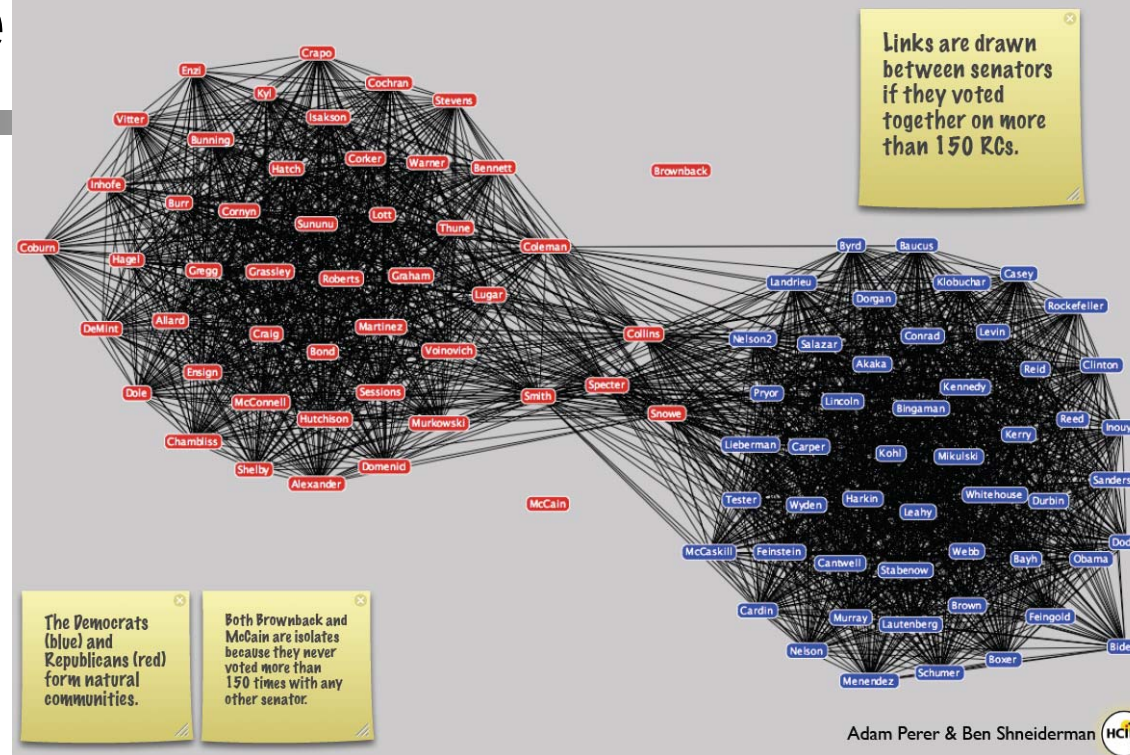


- Focused on semantic substrate layouts
- 2 case studies, 2-16 months
(political scientists, bio-diversity researcher)
- Identified guidelines for substrate design, gave researchers new language for discourse, clarified benefits & limitations of semantic substrates

MILC example

Senatorial Social Network

- Evaluate SocialAction



- Focused on integrating statistics & visualization
- 4 case studies, 4-8 weeks (journalist, bibliometrician, terrorist analyst, organizational analyst)
- Identified desired features, gave strong positive feedback about benefits of integration

Case Study Methodology



- 1) Interview (1 hr)
- 2) Training (2 hr)
- 3) Early Use (2-4 weeks)
- 4) Mature Use (2-4 weeks)
- 5) Outcome (1 hr)

Take Away Messages



New visualization strategies:

- + Network Visualization by Semantic Substrates
- + SocialAction

New evaluation method:

- + Multidimensional In-Depth Long-term Case Studies

www.cs.umd.edu/hcil/nvss

www.cs.umd.edu/hcil/socialaction

Sponsors: Microsoft &

U.S. National Science Foundation grant “Inter-Court Relations in the American Legal System: Using New Technologies to Examine Communication of Precedent II”

