nanoHUB.org
Impact on Research

Gerhard Klimeck

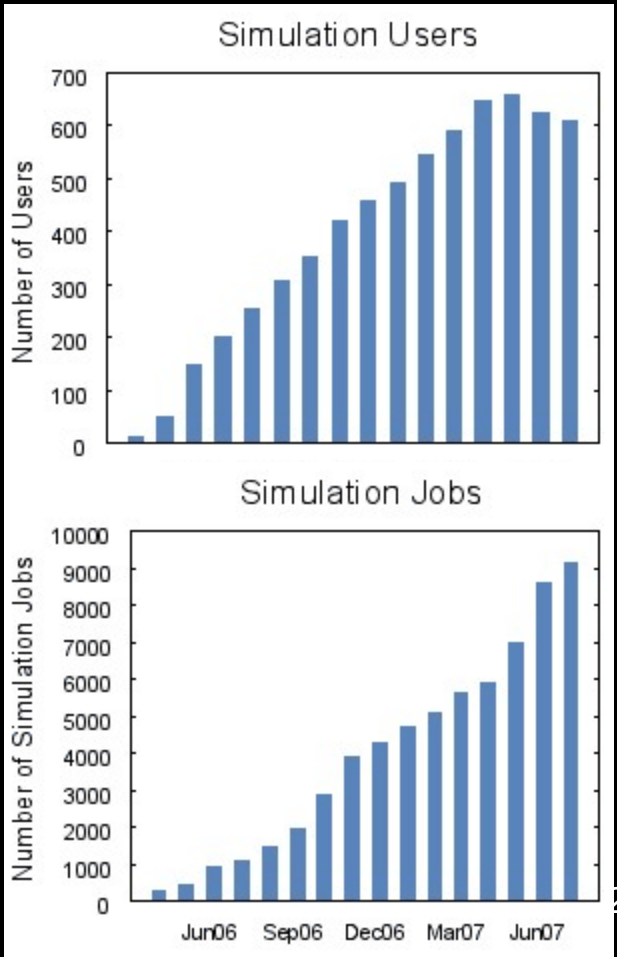
nanowire

Usage Statistics until June 2007

Released May 19, 2006

610 Users

9,115 Simulations



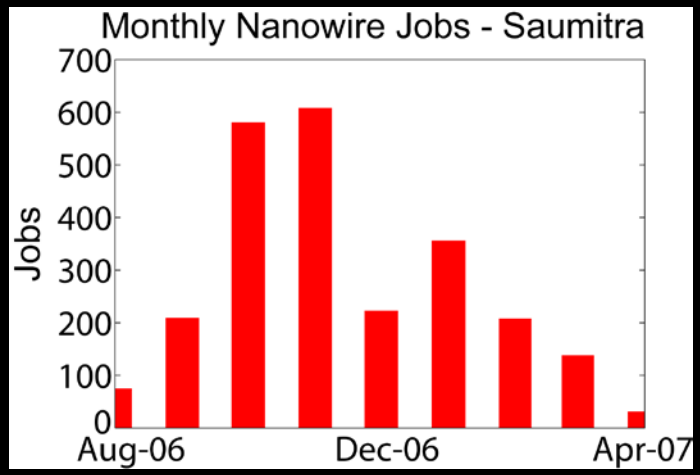
Saumitra Mehrotra

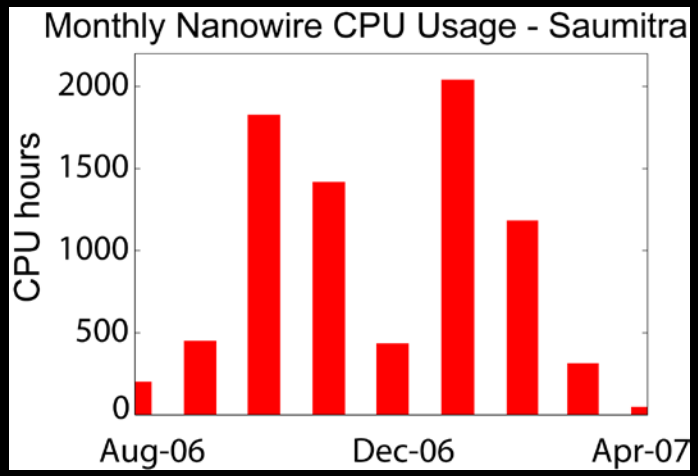
Univ. of Cincinnati

- August 06 – April 07:
- 26 tools / 3,327 simulations
- 47 simulations: bandstructure lab
- 240 simulations: FETtoy
- 2,855 simulations: nanowire
- 8,242 nanowire CPU hours

- "and more" content
  134 items, 52 hours

- 96 support tickets
  69 entered manually,
  27 filed automatically by application





IEEE Workshop on Microelectronics and Electron Devices (WMED), April 20 2007

Process Variation Study for Silicon

Simulation Tool

SiNW FET Vs FinFET – Gate Length Variatio

Process Variation Study for Silicon Nanowire Transistors

performance in circuits and superior reproducibility for the SiNW FETs.

Fig. 4 shows the variation in the threshold voltage with change in the gate dielectric thickness. Again, the SiNW FET shows a smaller variation (1.2 mV/A) compared with the FinFET's 5 mV/A. Also of interest is the sensitivity of the devices to the gate length. Shown in Fig. 5 is the threshold

REFERENCES

[1] W.S.Shi et al., "Synthesis of Large Areas of Highly Oriented, Very Long Silicon Nanowires," *Adv. Mater.* 12, 1343, 2000.

[2] D. Ma et al.," Small-Diameter Silicon Nanowire Surfaces," *Science*, 299, p. 1874, 2003.

[3] Y. Cui, Z. Zhong, D. Wang, W. U. Wang, and C. M. Lieber, "High

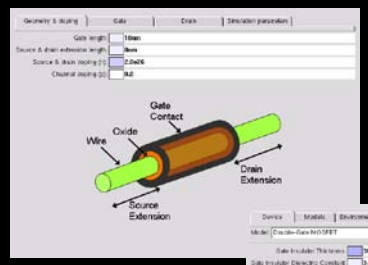
[7] J. Wang, E. Polizzi, M. Lundstrom, "A three-dimensional quantum simulation of silicon nanowire transistors with the effective-mass approximation," *Journal of Applied Physics* **96**(4), pp. 2192-2203, 2004.

[8] Simulations were performed on http://nanohub.org

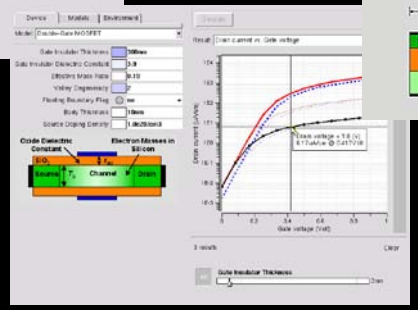
[9] J. Wang, E. Polizzi, and M. Lundstrom, "A computational study of ballistic silicon nanowire transistors," in *IEDM Tech. Dig.*, Dec. 8–10, 2003,pp. 695–698.

The software and your support have proven to be effective tools in stimulating the interest of these students in these nanoelectronics topics and in enabling them to investigate and learn about the new physics that these materials and devices entail. In the case of the doctoral student, his work utilizing the software has already ***resulted in a conference paper presented at the IEEE Nano 06 Conference in July 2006 and submission of a journal paper*** with other papers likely to follow.

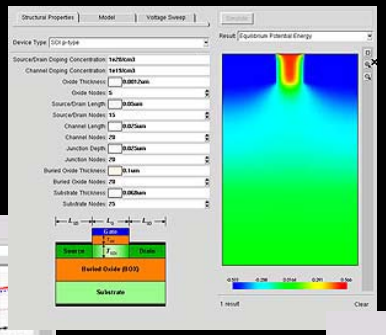
Kenneth P. Roenker
Prof. of Electrical and Computer Engr.
University of Cincinnati



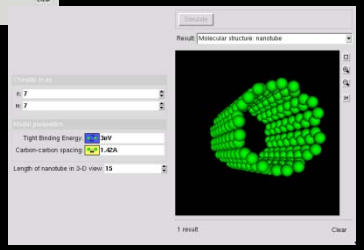
nanowire



FETToy



MOSFET



CNTbands

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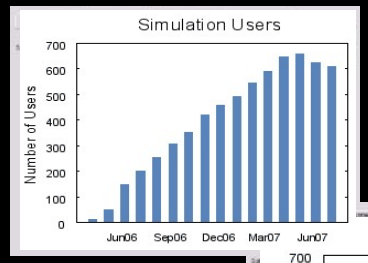
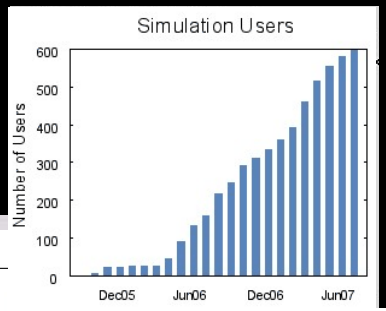
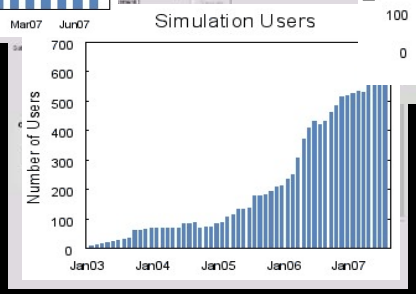


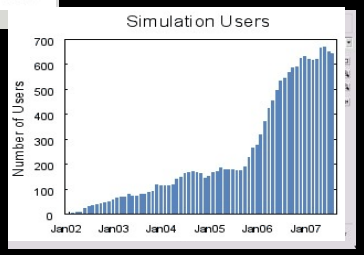
Nanowire
610 users
9115 sims



MOSFET
597 Users
6,350 sims



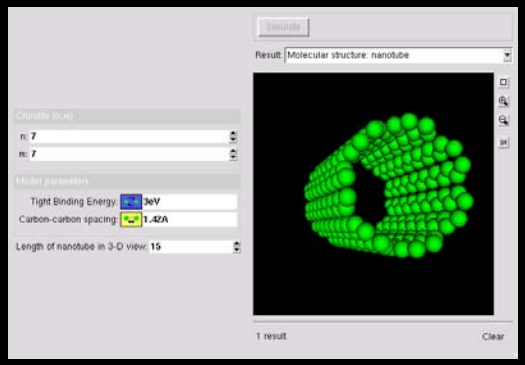
FETToy 593 Users
9,017 Simulations



CNTbands 644 Users
5,477 Simulations

Usage data until June 2007

By comparing the experimentally obtained DOS with the simulated ones which I obtain using the CNTbands tool, I have been able to determine the chirality of the CNTs I have been probing experimentally. ***I indeed use the CNTbands tool very frequently*** and I am considered to be among the top users of such a tool – an ***indication of how important it is in my research.***



CNTbands

Noureddine Tayebi
Department of Electrical and Computer Engineering
Beckman Institute for Advanced Science and Technology
University of Illinois, Urbana-Champaign

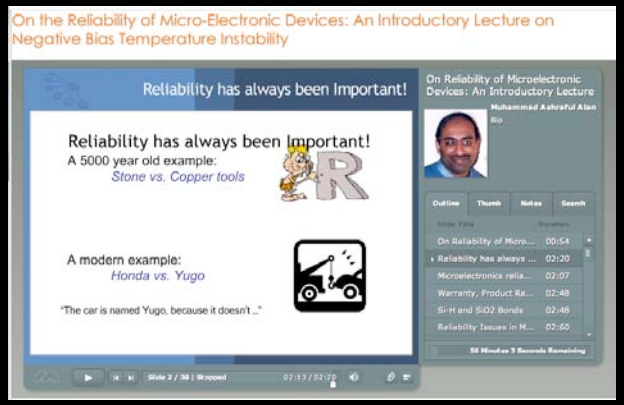
An experimentalist using tools!

Citations to Presentations

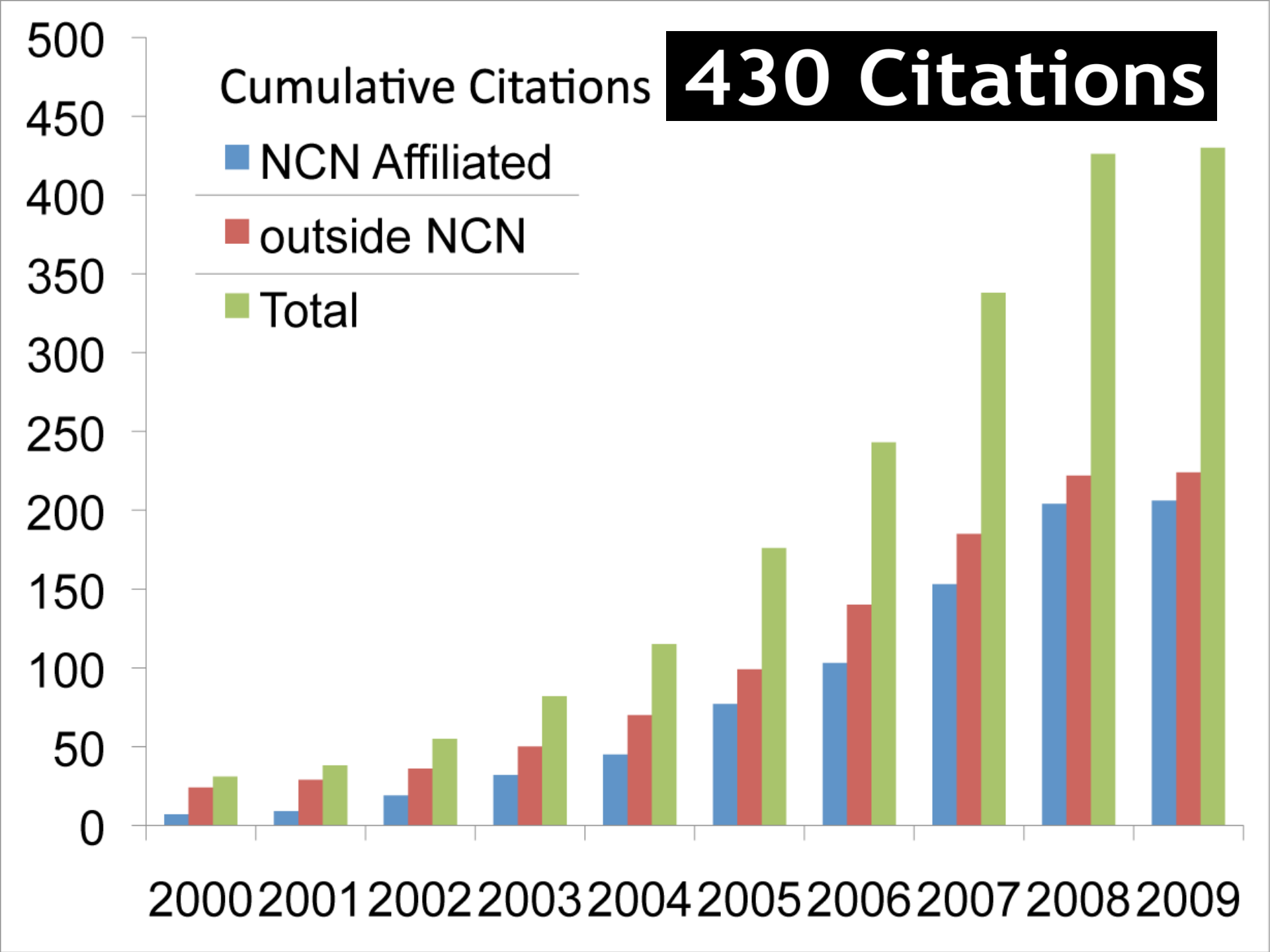
Citation:
M. A. Alam, “On the Reliability of Micro-electronic Devices: An Introductory Lecture on Negative Bias Temperature Instability,” in Nanotechnology 501 Lecture Series, Sept 2005. Available at http://www.nanohub.org/resources/?id=193.

An Analytical Model for Negative Bias Temperature Instability

SV Kumar, CH Kim, SS Sapatnekar
ICCAD’06, November 5-9, 2006, San Jose,CA



147 users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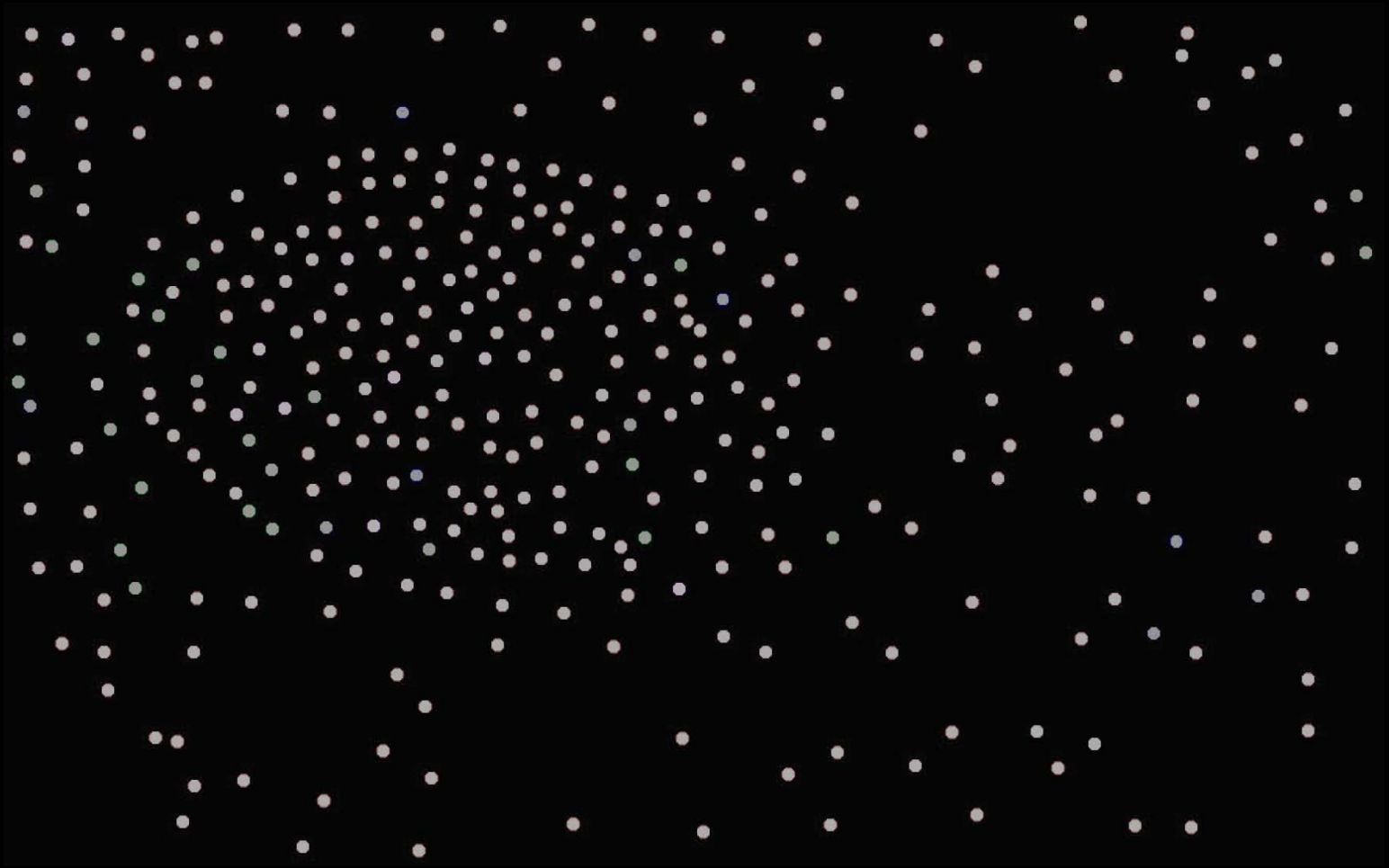
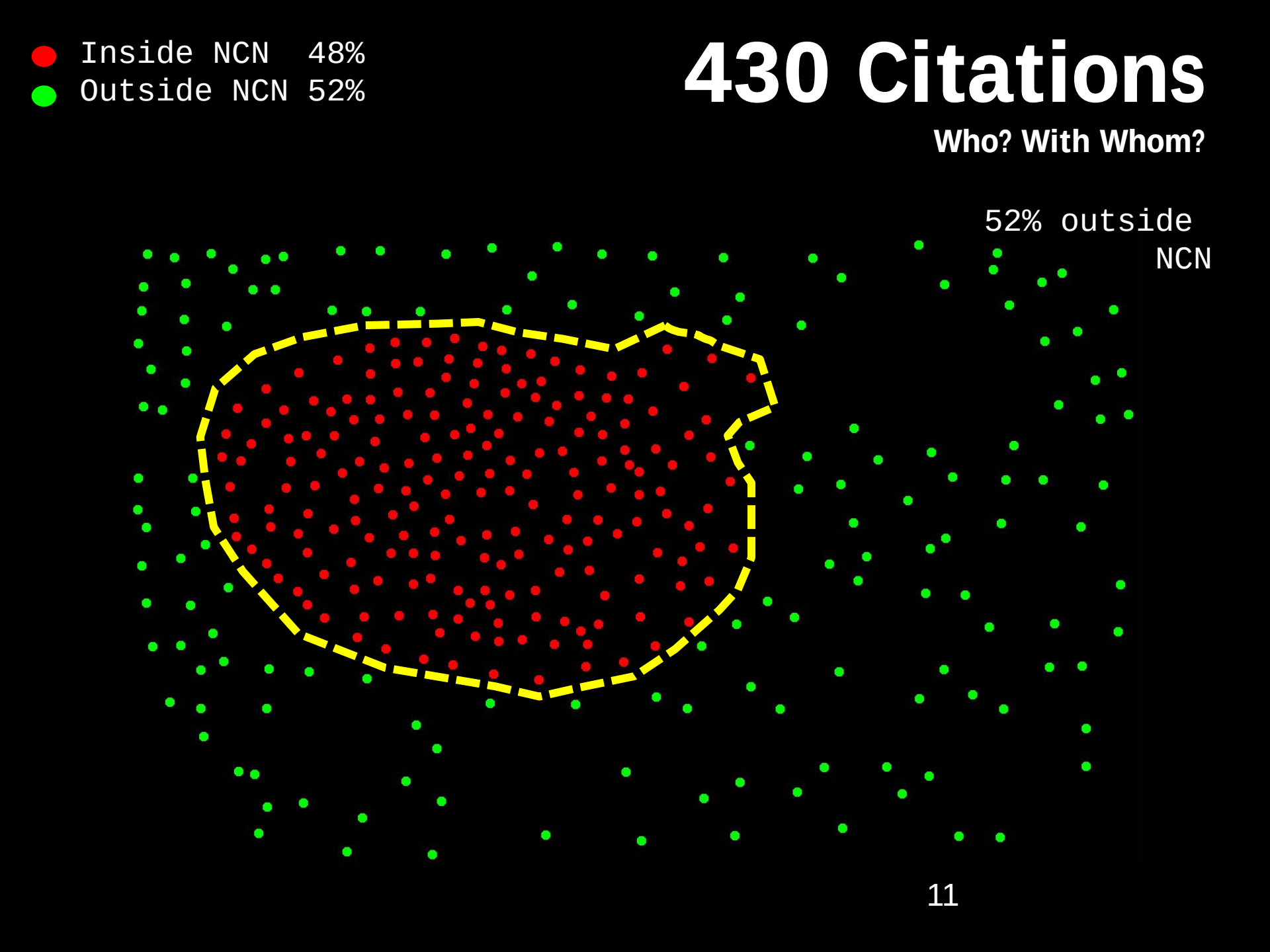


430 Citations

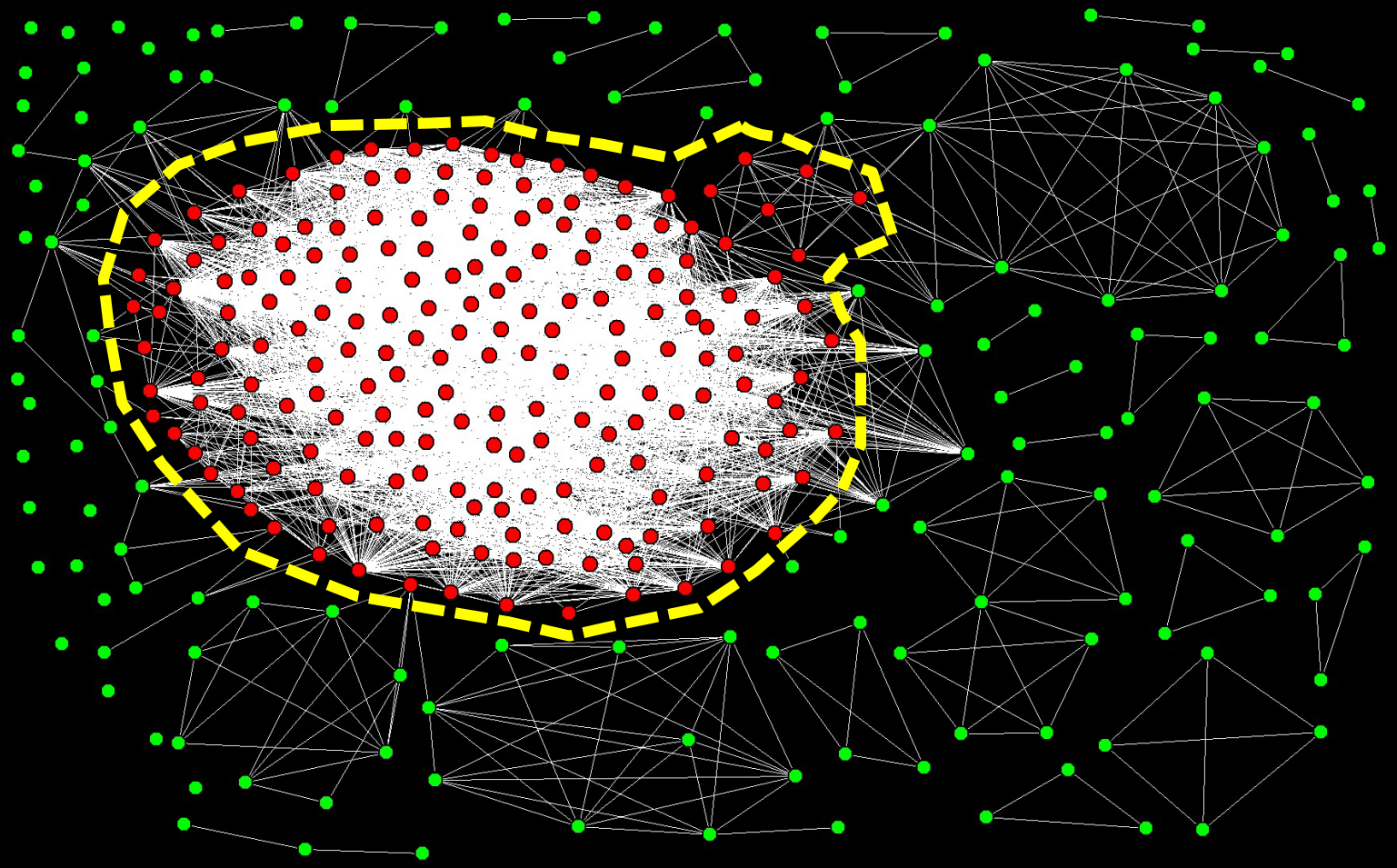
Who? With Whom?



Inside NCN 48%
Outside NCN 52%

430 Citations

nodes are papers, links common authors

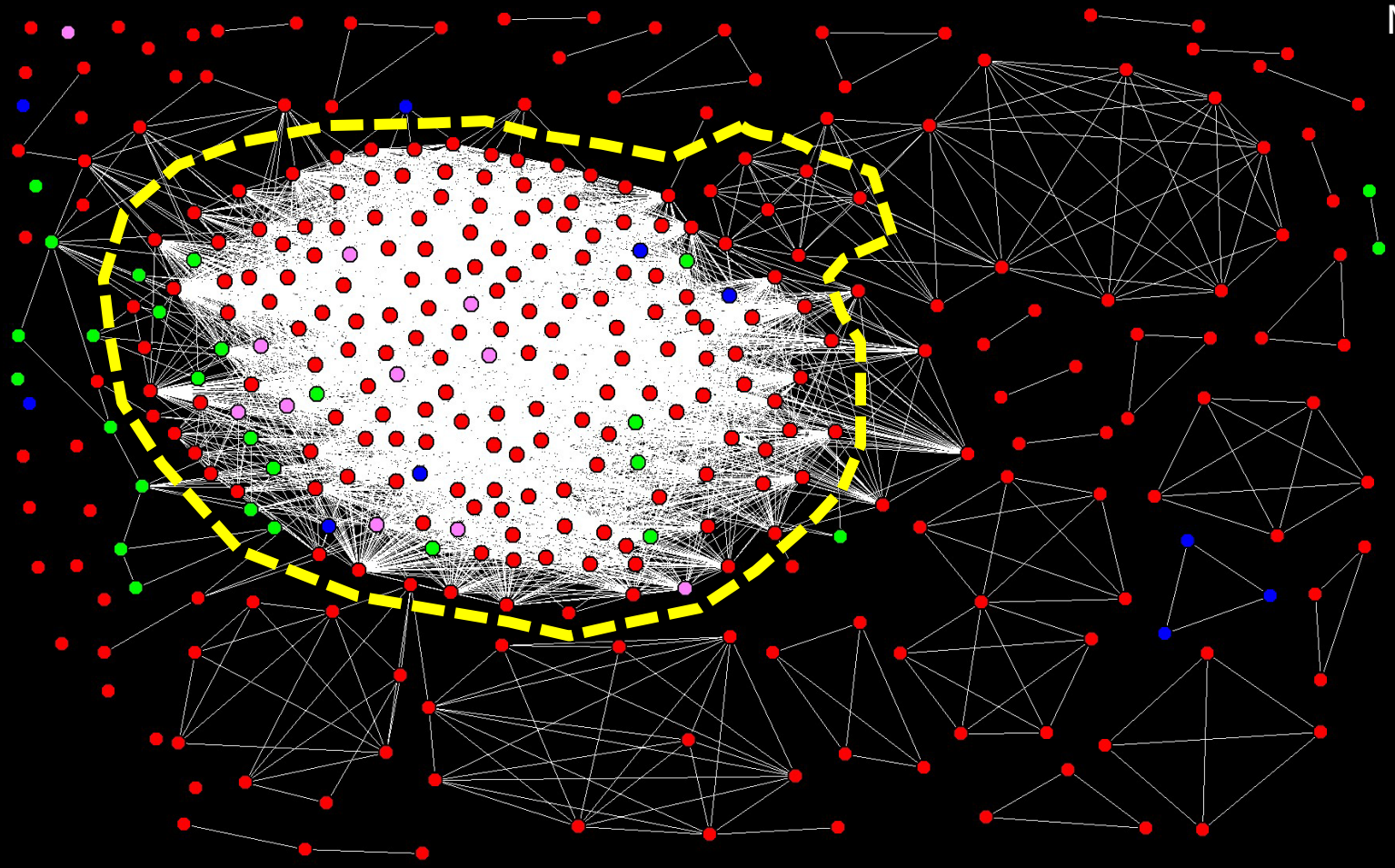


430 Citations

What?

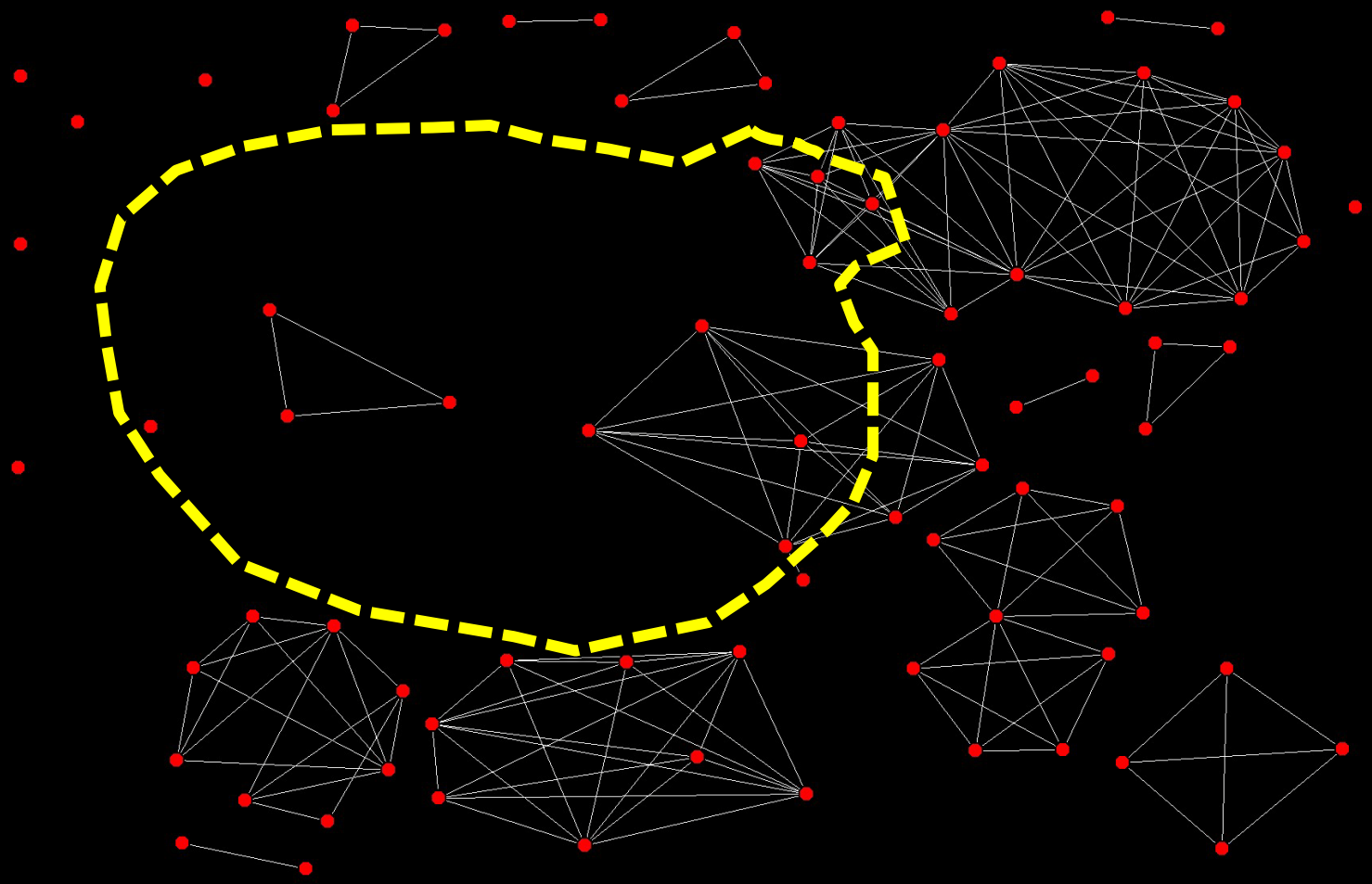
Research	338	79%
Infr./About	26	6%
Education	37	9%
Cyberinfr	68	16%

52% outside NCN

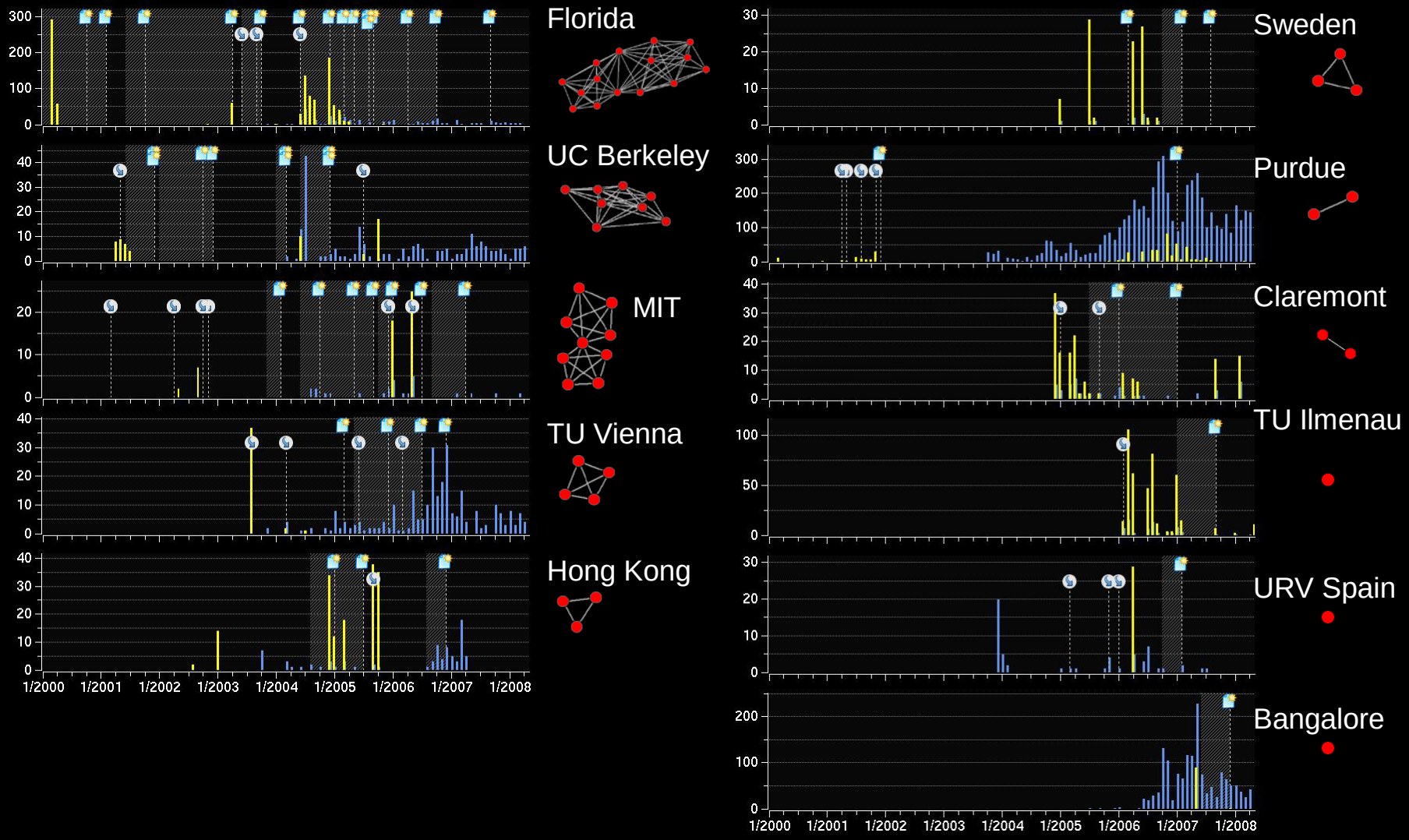


92 Schred Citations

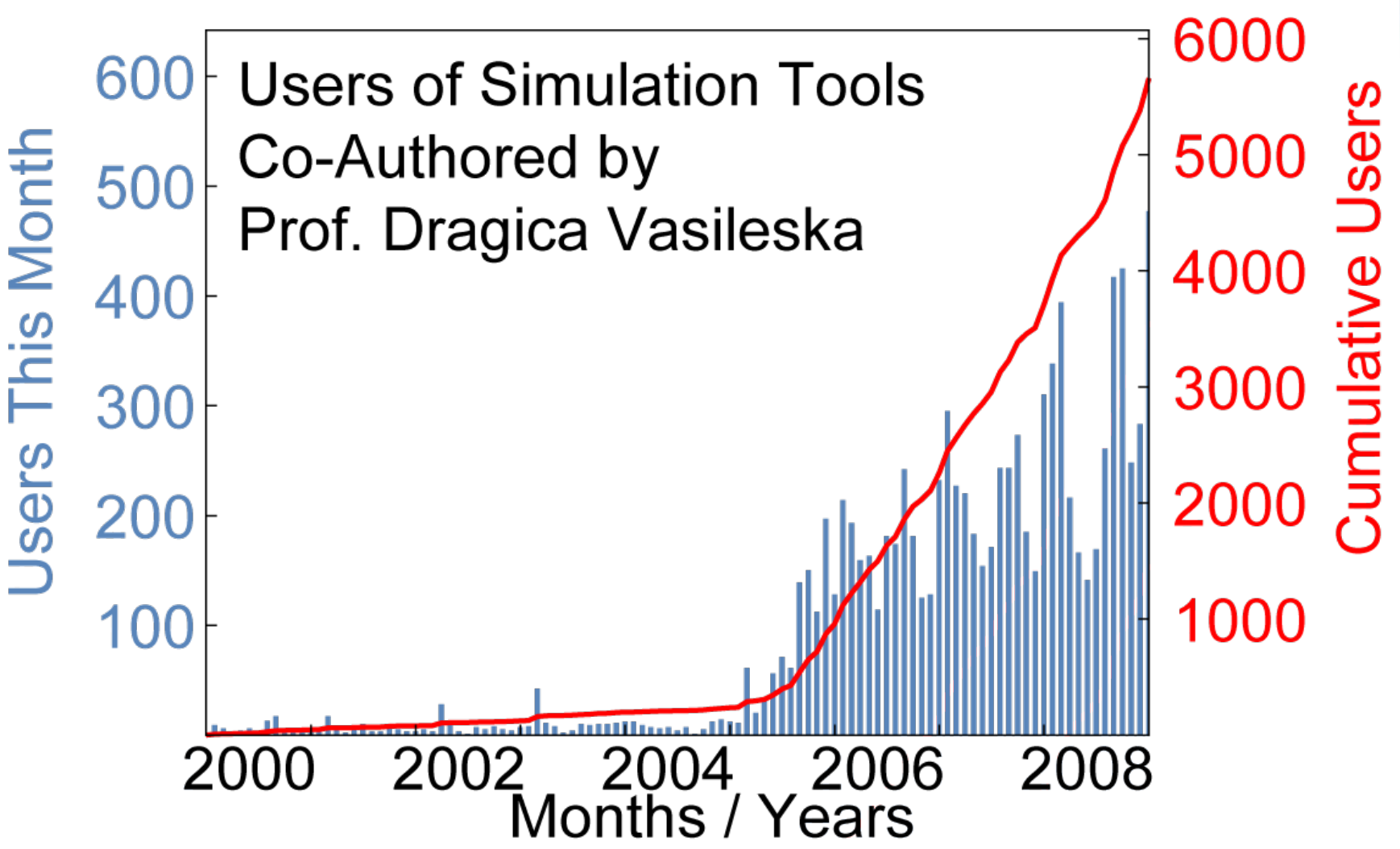
nodes are papers, links common authors



ASU Schred Group has citations from



nanoHUB: Another Way to have Impact With Research



nanoHUB.org: Impact on Research

- 430 citations in the scientific literature
- 52% outside of the NCN
- Developing a social network of usage and collaboration
- Can show usage on nanoHUB and subsequent publications
- Individual testimonials of research use
- Demonstrate use by experimentalists
- Can measure impact by tools in terms of usage, users, and citations
  => incentive for tool publishers