HUBzero:
Connecting Data, Tools, and People

Michael McLennan, Ph.D.

Director, HUBzero® Platform for Scientific Collaboration
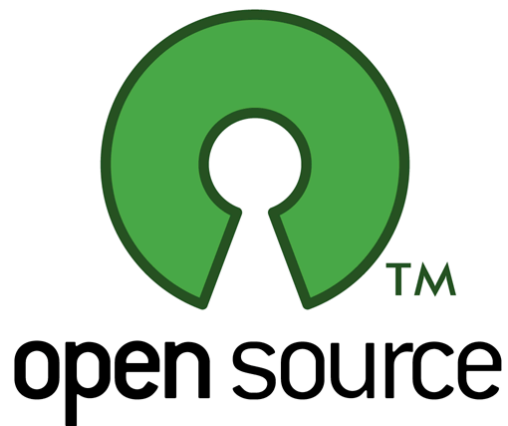
Purdue University

mmclennan@purdue.edu

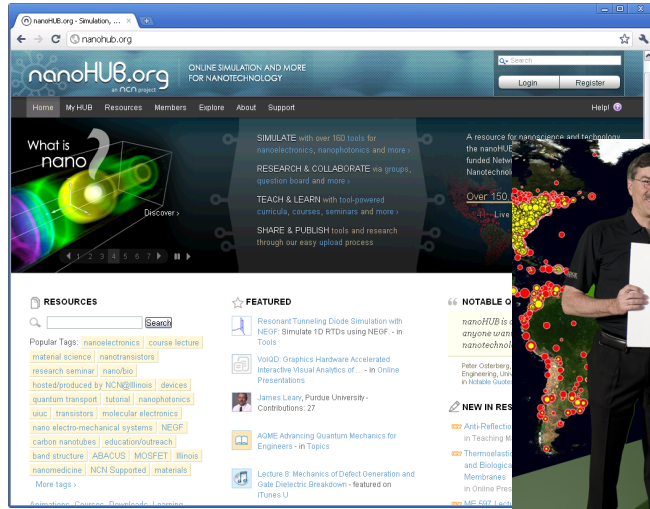**@hubzeroplatform**

hubzero

What is HUBzero?

Open source software platform used for building

"Science Gateways"
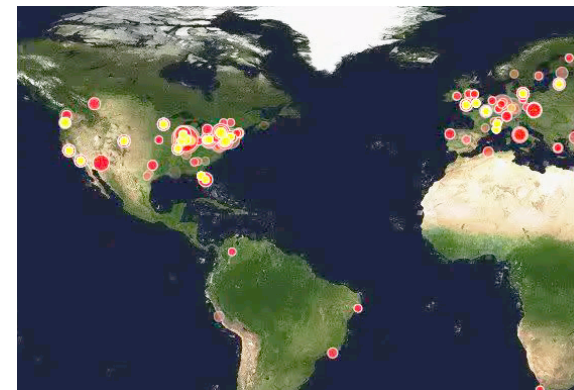*"Collaboratories"*
"Hubs"

Started with nanoHUB.org

Network for Computational Nanotechnology
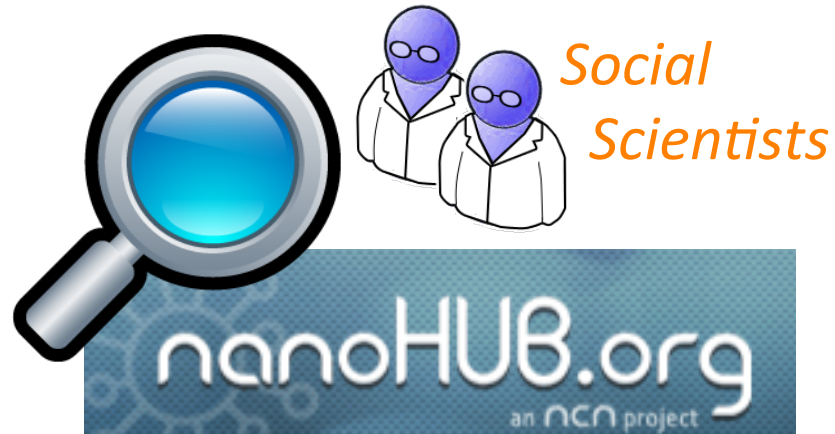**Established in 2002**

Awards
EEC-0228390
EEC-0634750
OCI-0438246
OCI-0721680

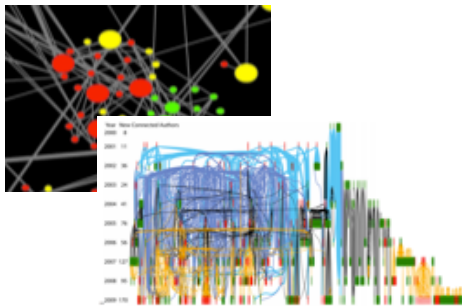|	
730,877	Visitors
324,560	Users
362	Simulation Tools
4,651	Resources
1,191	Citations
22,649	Students at 185 Institutions

Case Study: nanoHUB

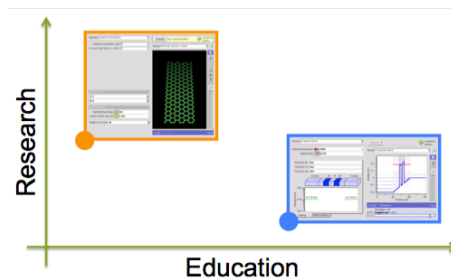*Social Scientists*

nanoHUB.org
an NCN project

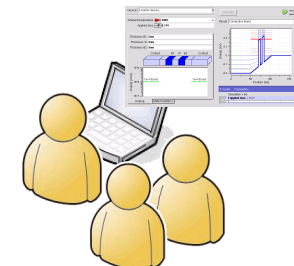## Academic Literature
How researchers are citing nanoHUB

Impact on Education
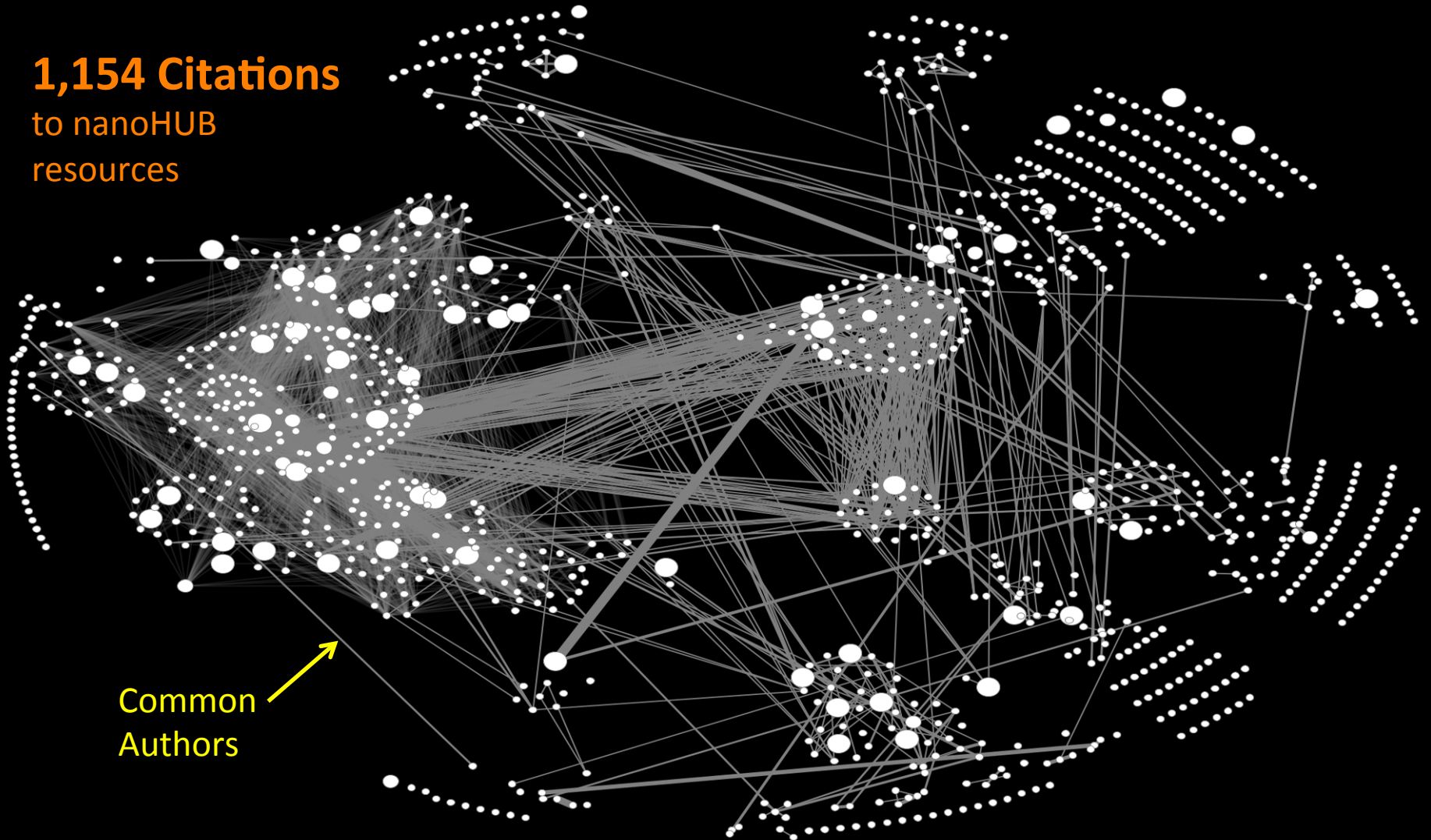How tools are used in classrooms

Team Science
How researchers work together online

Coathorship Citation Network

1,154 Citations
to nanoHUB
resources

Common
Authors

Focus of each paper
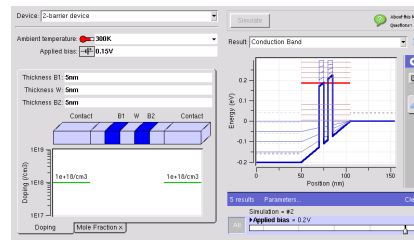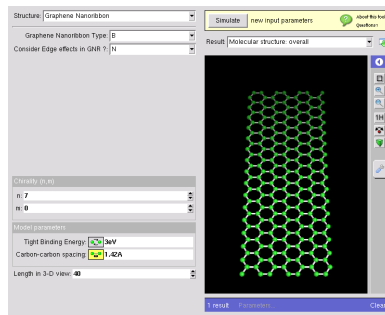
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Research

Research/Education

81%

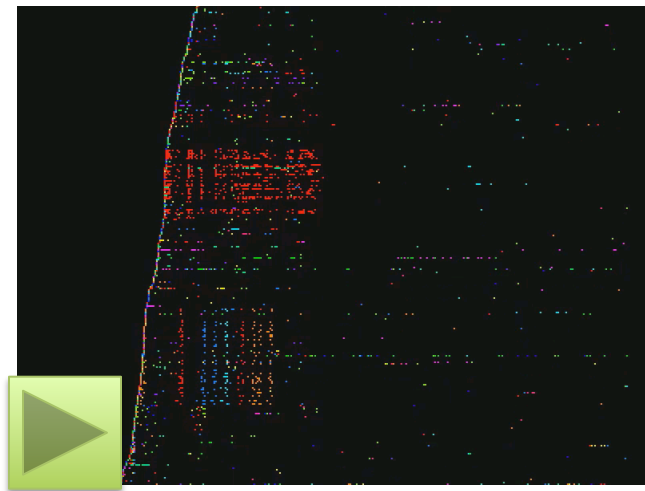Analysis of Scaling Strategies for Sub-30 nm Double-Gate SOI N-MOSFETs

Education

Electrical characteristics related to silicon film thickness in advanced FD SOI–MOSFETs

Simulation/Modeling Tools in the Classroom

- Classroom demonstrations
- Virtual lab assignments
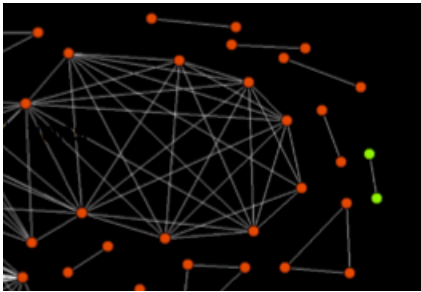- Senior design projects

22,649 students
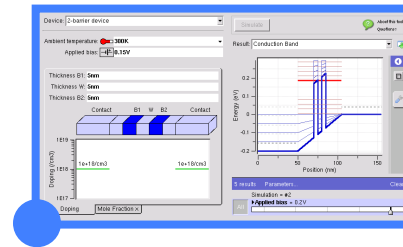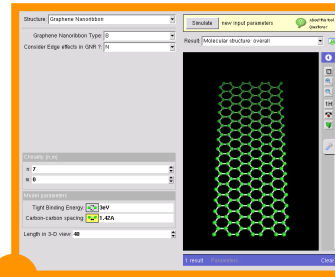**1,165** courses
185 institutions

Tools Span Education and Research

More citations

Research

Education

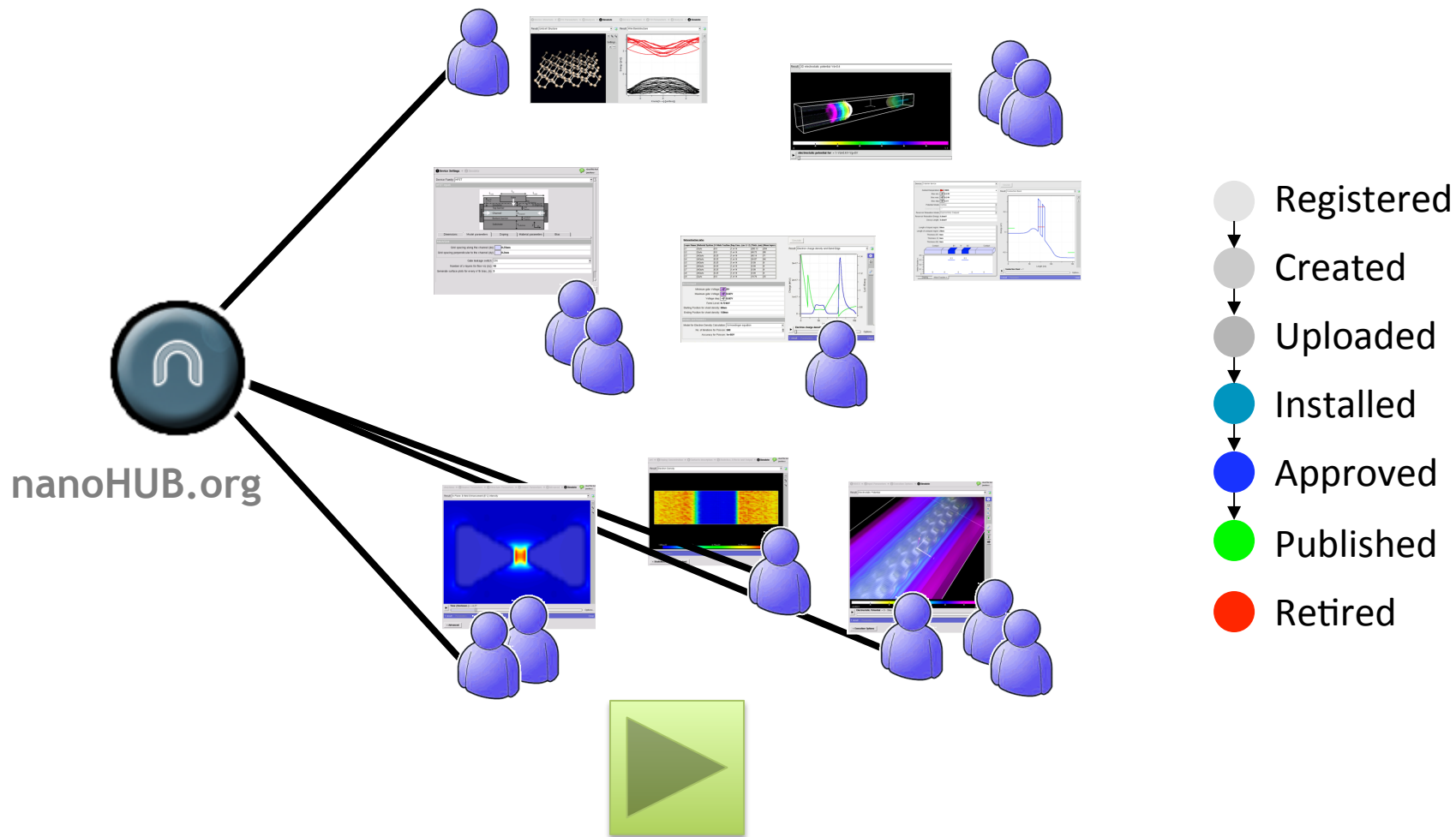More classroom use

Use evolves over time

Collaborative Tool Development

nanoHUB.org

Registered

Created

Uploaded

Installed

Approved

Published
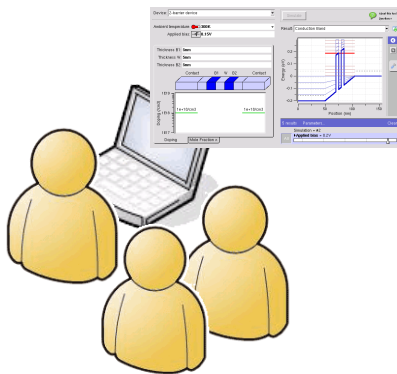
Retired

Studying teams of tool developers
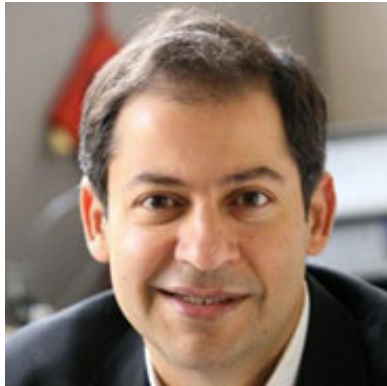
Some Assembly Required: Organizing in the 21st century

Noshir Contractor
Northwestern University

Presented at HUBbub 2012, Indianapolis
https://hubzero.org/resources/771

Teams had more success if...

Many versions (improvements) $\Rightarrow$ *Good Ratings*

Open Source
Authors from different universities $\Big\}\Rightarrow$ *More Citations*

Authors from different countries
Many versions (improvements) $\Big\}\Rightarrow$ *More Users*

60+ Hubs for many disciplines

	visitors	users		
	730,877	324,560	nanoHUB.org	nanoHUB.org
	422,031	137,460	NEEShub	nees.org
	65,389	8,645	habri central	HABRIcentral.org
	63,419	23,725	GLOBALHUB	GlobalHUB.org
	62,918	7,468	ciHUB.org	ciHUB.org
	53,422	26,432	PHARMAHUB	pharmaHUB.org
	51,771	11,267		molecularHUB.org
	42,710	5,052	iemHUB	iemhub.org
	40,234	9,817	VHUB	vhub.org
	37,957	9,416	cceHUB	cceHUB.org
	36,588	4,386	PURR	PURR
	34,879	3,315	DiaGrid	DiaGrid.org

~1,800,000
visitors total

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http://hubzero.org/pressroom

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- Simulation/modeling tools

- Data management

- Collaboration and social networking

- Analytics to measure impact