Overview of the HUBzero Platform

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Why Cyberinfrastructure?

Title: Center for Genomic Studies on Mental Disorders (U24)

Request for Applications (RFA) Number: RFA-MH-08-100

Center will function as a single, national resource. A new critical feature of the Center will be the establishment of a genomic cyberinfrastructure that represents the coordinated aggregate of software, hardware and other technologies, as well as human expertise, required to support current and future discoveries in the genetics of mental disorders. This cyberinfrastructure will integrate relevant and often disparate genetic and genomic resources to provide a useful, usable, and enabling framework for human genetic research and gene discovery

2. **Educational Opportunities Using Cyberinfrastructure and Virtual or Mixed Reality (Explo**

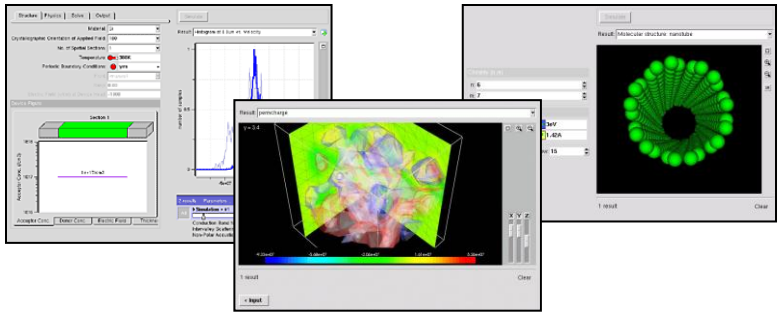
Applications of networked computing and communication, sophisticated user input, and dynan only begun to realize the potential benefit of these new technologies to improve, enhance, an education. Many innovative projects in cyberlearning, virtual environments and laboratories, in visualizations and tutoring systems have required the development of new technology. Howev

- Supporting the acquisition and development of instrumentation that contributes to, or takes advantage of, existing investments in cyberinfrastructure, while avoiding duplication of services already provisioned by NSF investments. Please consult the NSF document, "Cyberinfrastructure

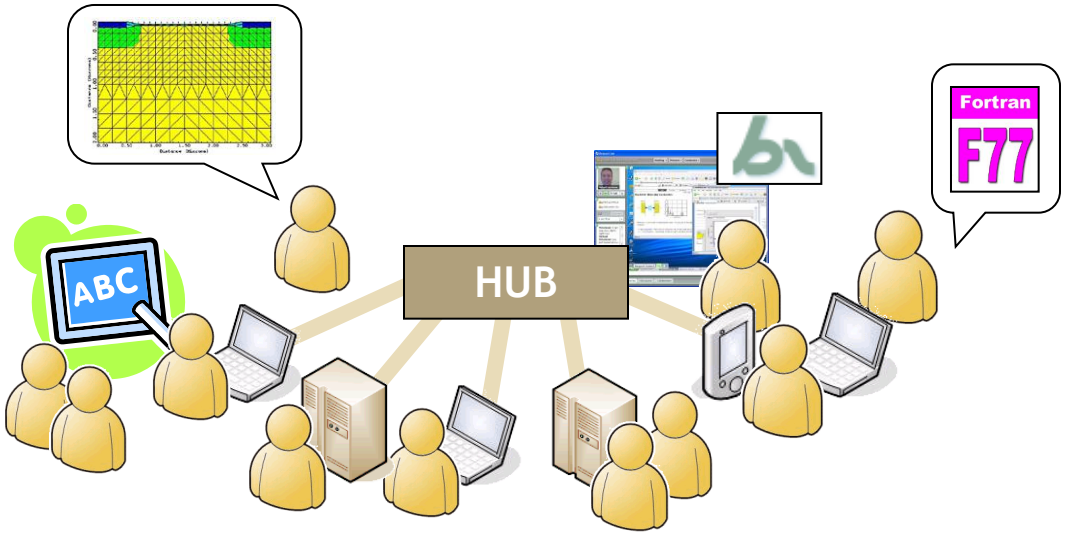
across the United States. It should have known expertise in the targeted program areas of interdisciplinary graduate education and professional development. It is also expected that the lead institution will have known expertise in the IT field, developing and maintaining cyber-communities and communication modes, and in addressing the needs of the community the Resource Center is meant to support.

Cyberinfrastructure = HUB

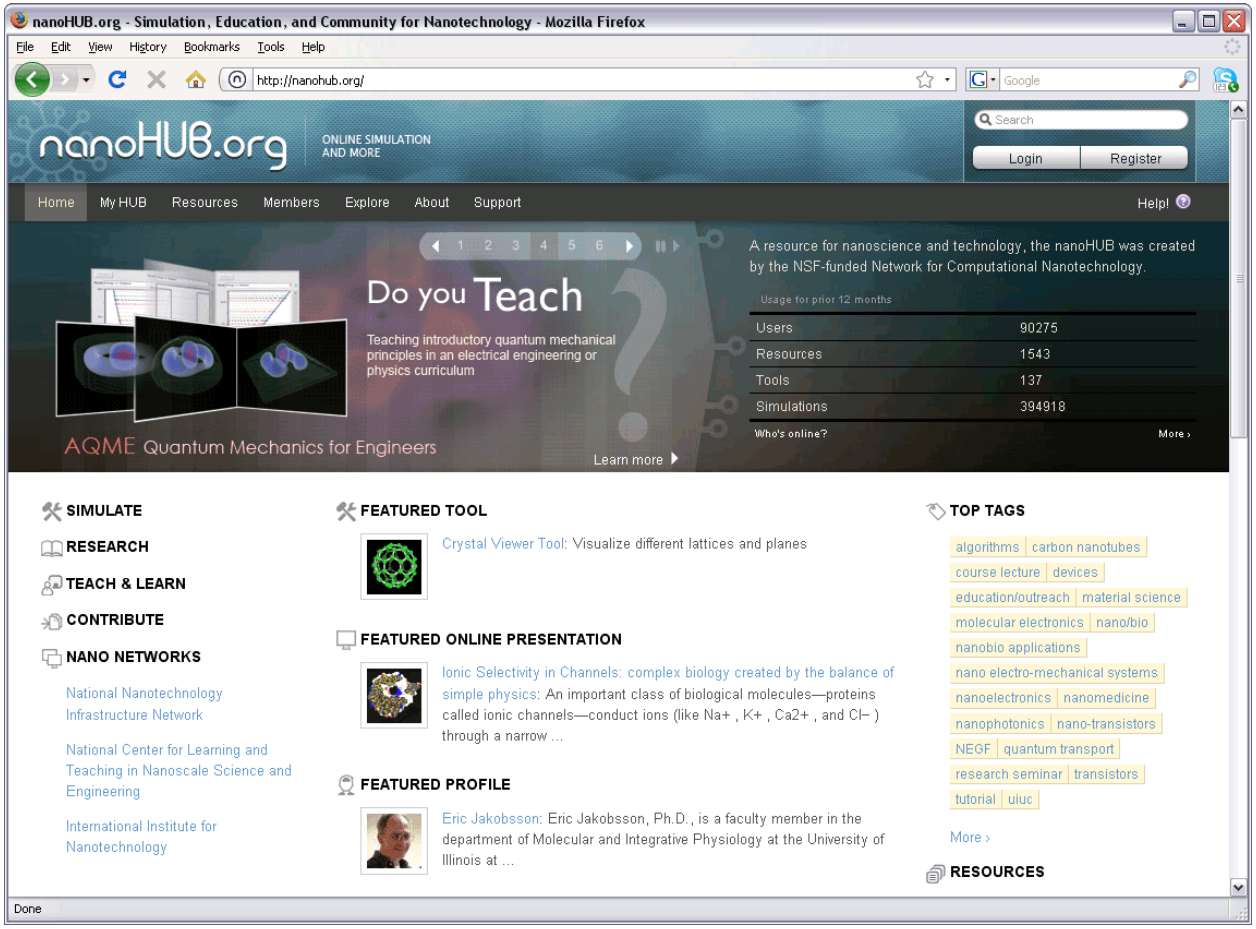
Online simulation…



…and more!



What is a HUB?



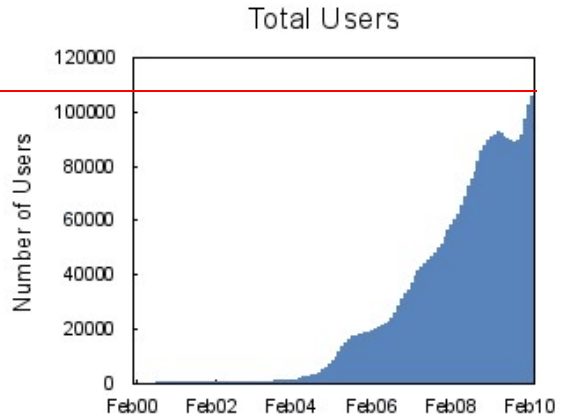
Example: nanoHUB.org

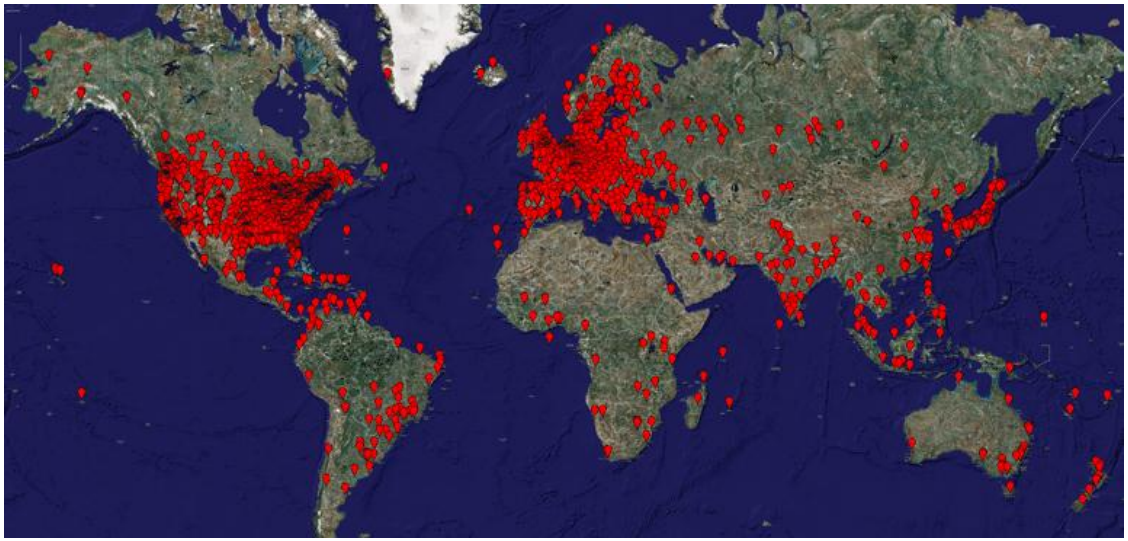
Demo: AVI MOV YouTube

nanoHUB.org Usage Statistics

105,000 users worldwide

>5,000,000 hits/month
All Top 50 US Engr Schools
14% of all .edu domains
333 International Ed Institutions
233 US K-12 schools



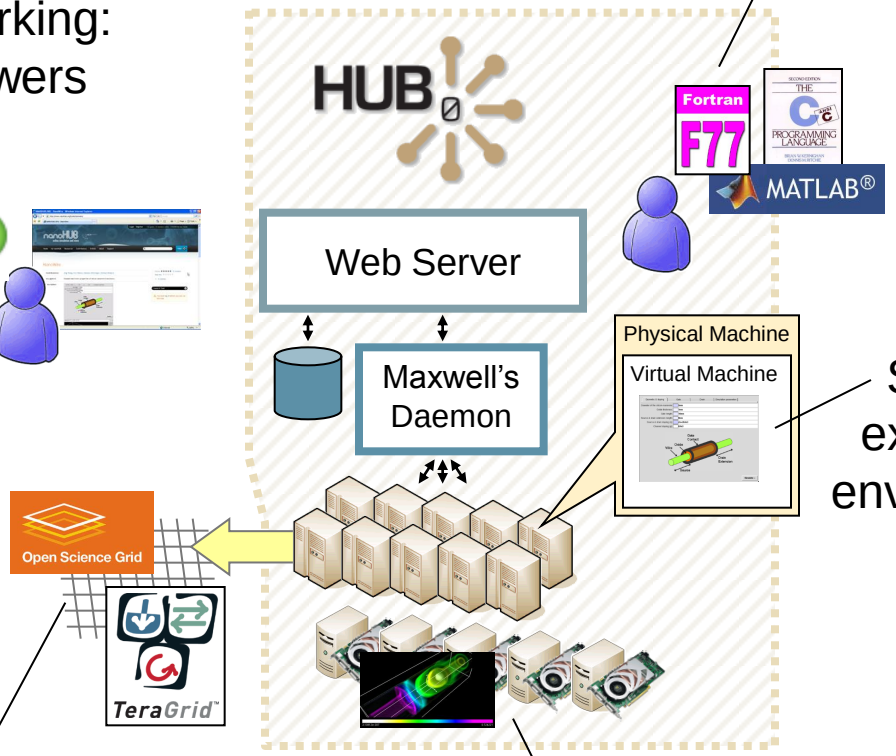


Platform for Scientific Collaboration

"YouTube" for simulation and modeling tools

Little bit of social networking: e.g., Questions & Answers

Virtual economy for incentives and managing resources

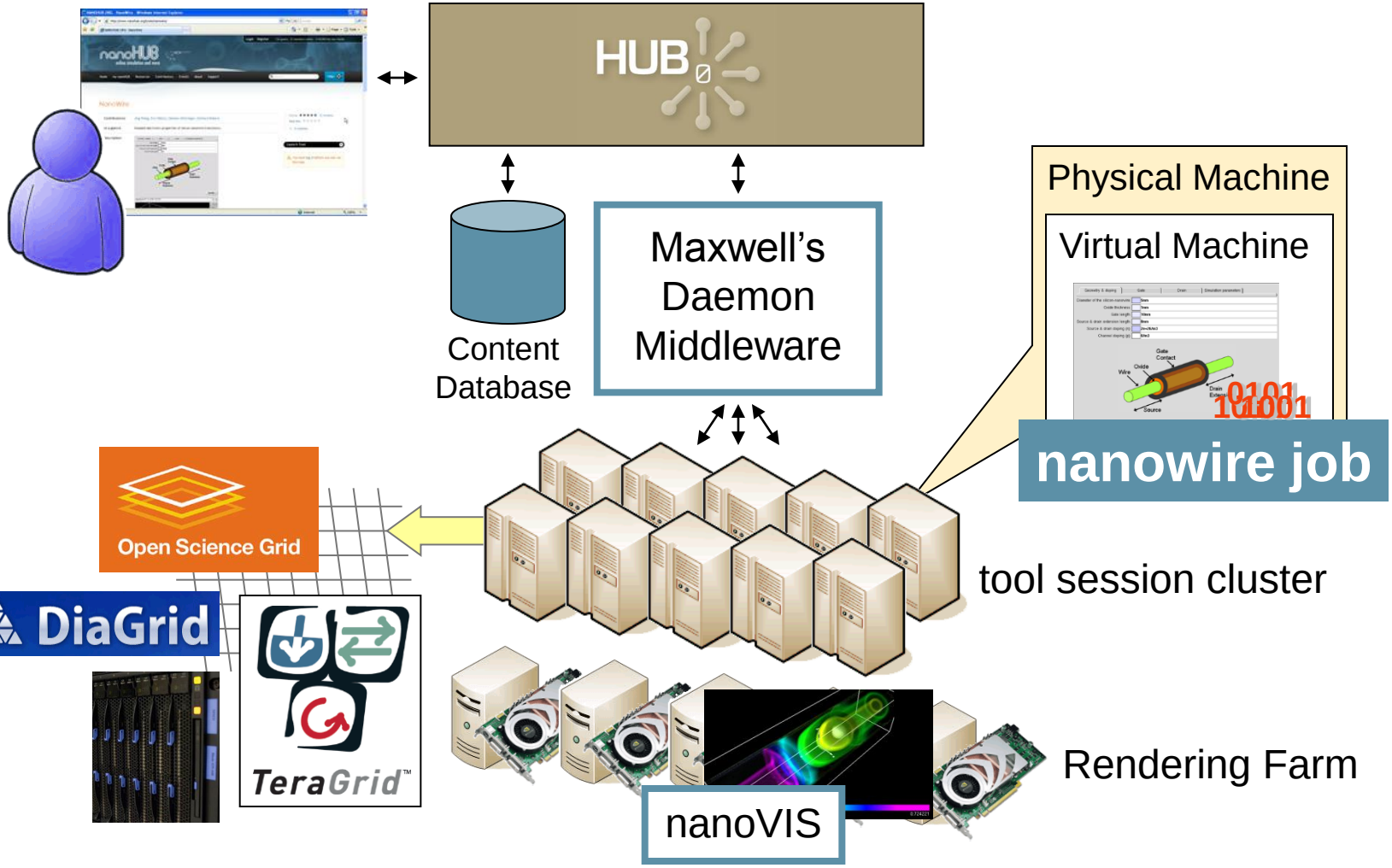


Secure execution environment

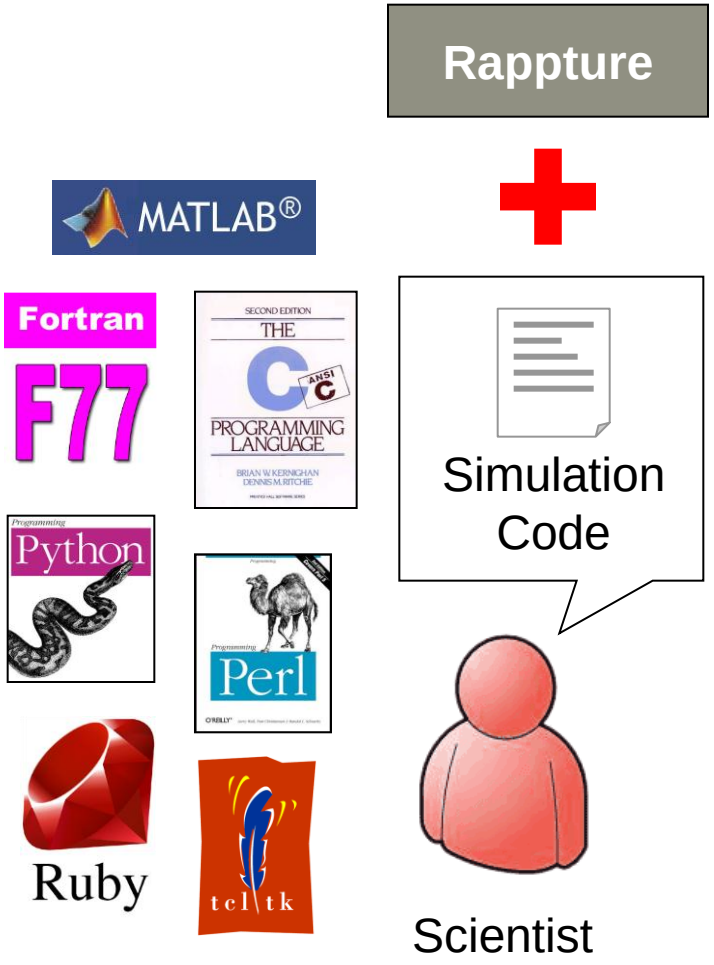
Tools powered by Grid infrastructure

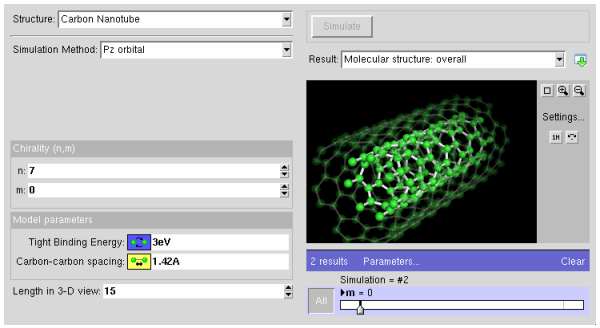
Integrated visualization

Cyberinfrastructure for Running Tools



Rappture: Rapid Application Infrastructure

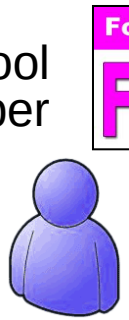




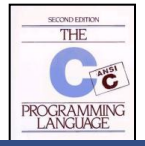
- Works with your favorite programming language
- Open Source
- Online at http://rappture.org
- Used by 200 projects and 300 developers

Cyberinfrastructure for Developing Tools

Tool Developer

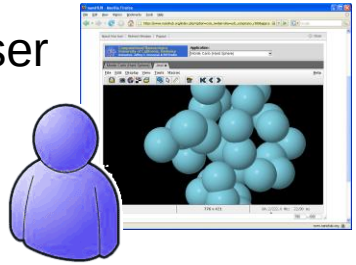


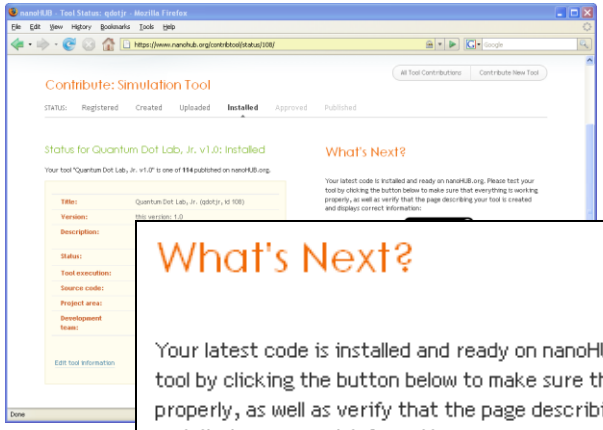
Fortran F77



- Registered
- Created
- Uploaded
- Installed
- Approved
- Published

End User





Web-based Publishing System

What's Next?

Your latest code is installed and ready on nanoHUB.org. Please test your tool by clicking the button below to make sure that everything is working properly, as well as verify that the page describing your tool is created and displays correct information:

Test your application: Launch tool

Review the page describing your tool

We're waiting for You

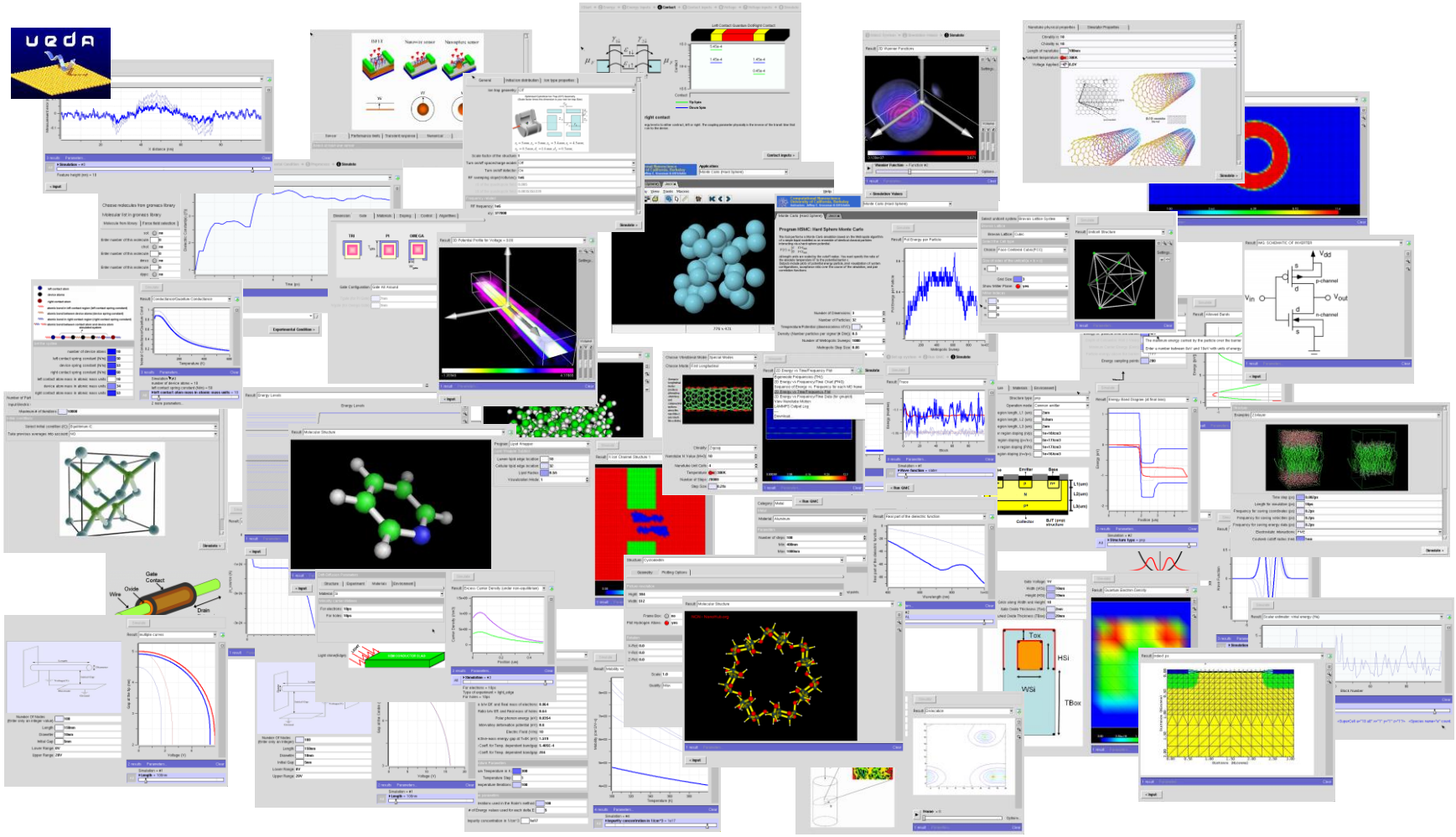
Once you tested your tool and verified that it is working properly, click here to let us know:

My tool is working properly. I approve it.

Need to make changes? Once you've checked in your latest fixes, click here to let us know:

I've fixed my code. Please install the latest updates.

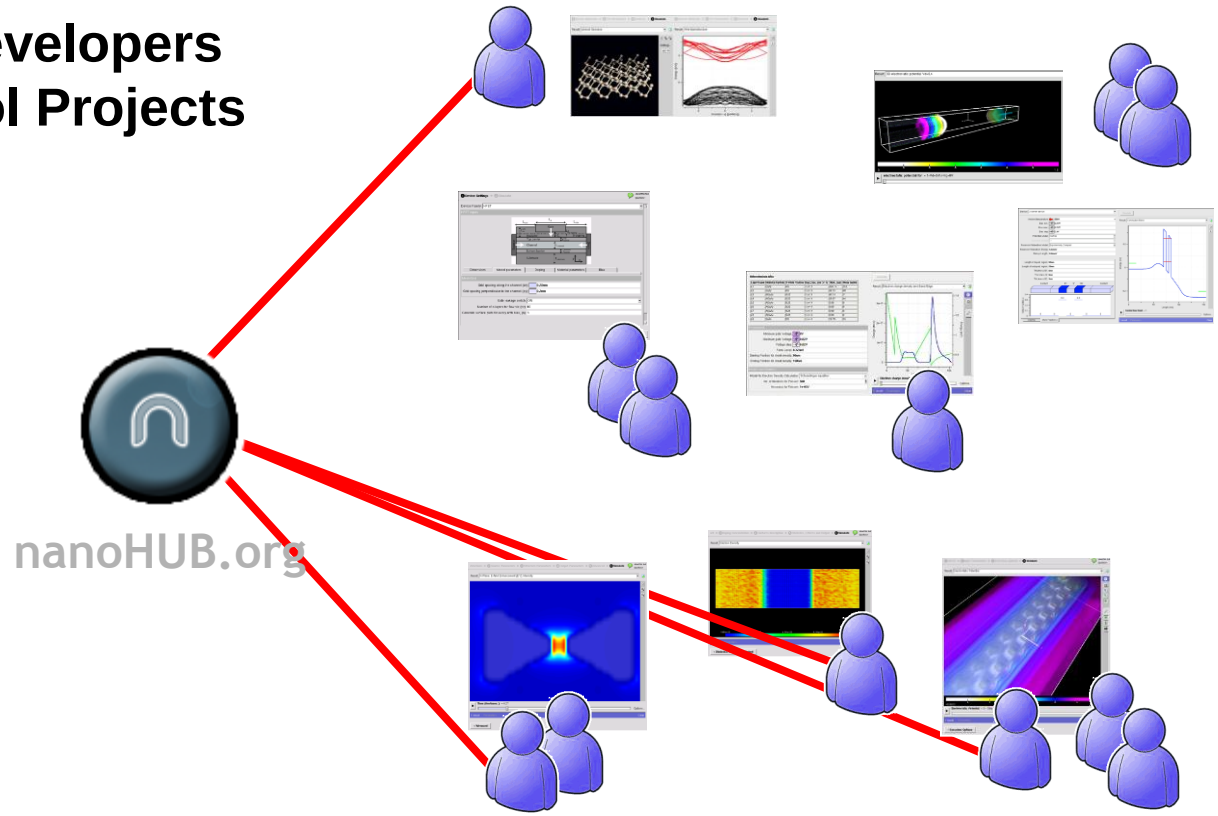
Hundreds of tools online!



Supporting hundreds of projects

Hundreds of Developers
Hundreds of Tool Projects

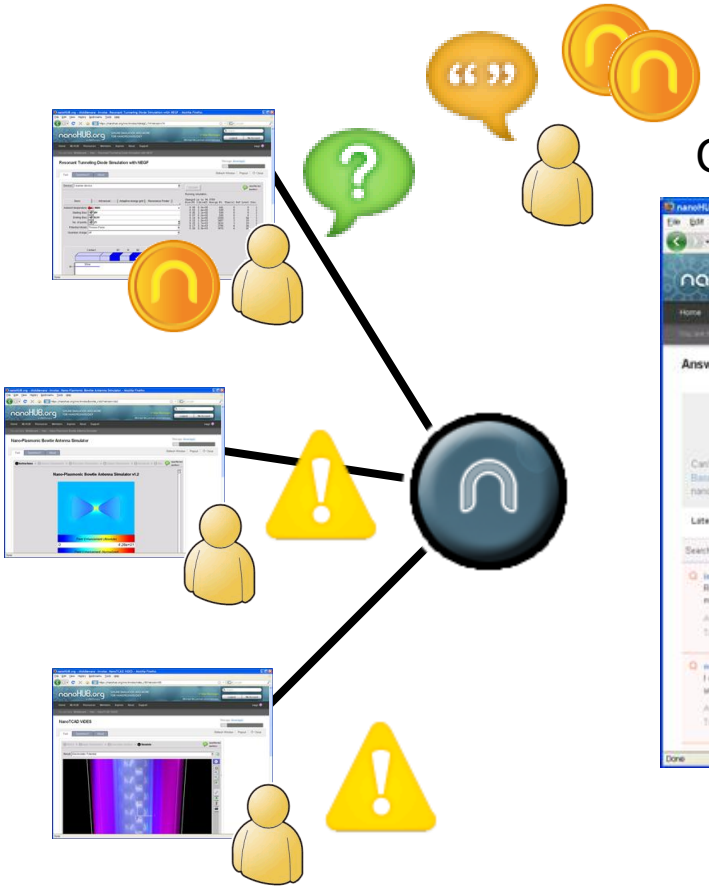
- Registered
- Created
- Uploaded
- Installed
- Approved
- Published



281 Tool Projects

Year of Development >>

Replicate, Support, Sustain



Question & Answer Forum

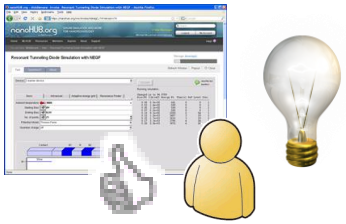
? ? ?

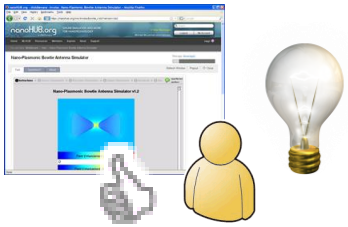
HUBzero team

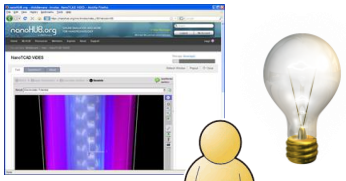
Replicate, Support, Sustain

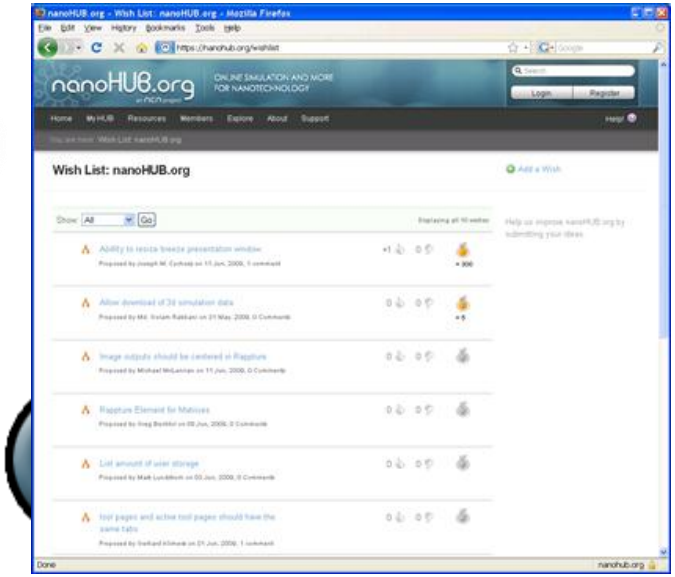
Developers see tickets on their "my HUB" page

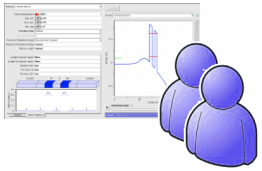
Wish Lists

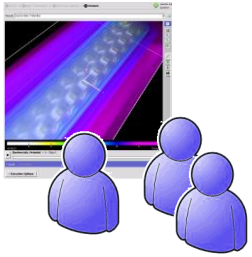


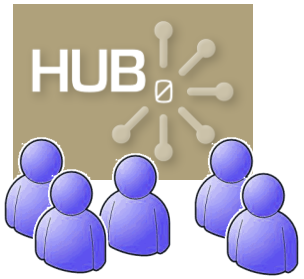












Community can vote
on wishes and
bid points for fulfillment

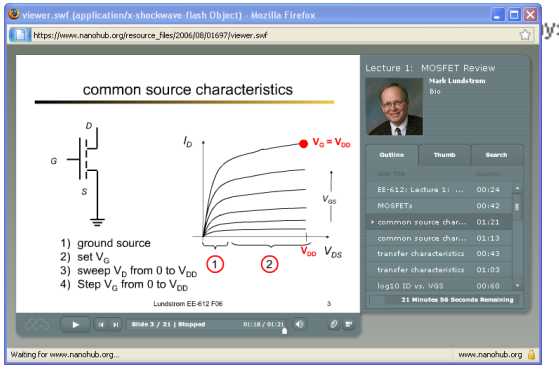
Supporting Education

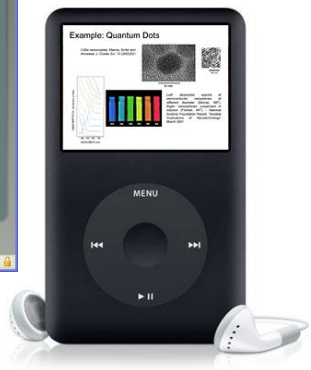
ECE 612 Nanoscale Transistors (Fall 2006)

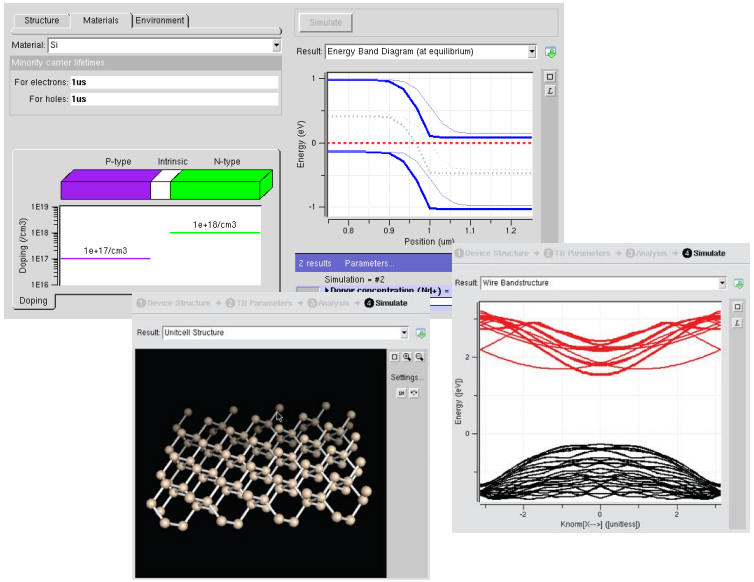
Contributor(s) Mark Lundstrom
Purdue University, West Lafayette

Abstract **Please Note:** An updated version of this course is in production f

ysics of advanced transistors







Teaching Materials:

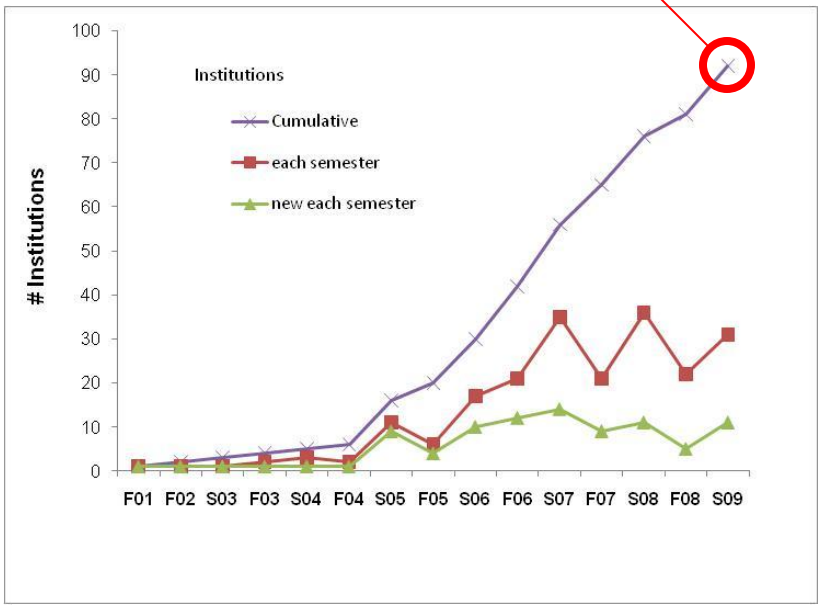
- Complete courses
- Tutorials and Podcasts
- Homework assignments

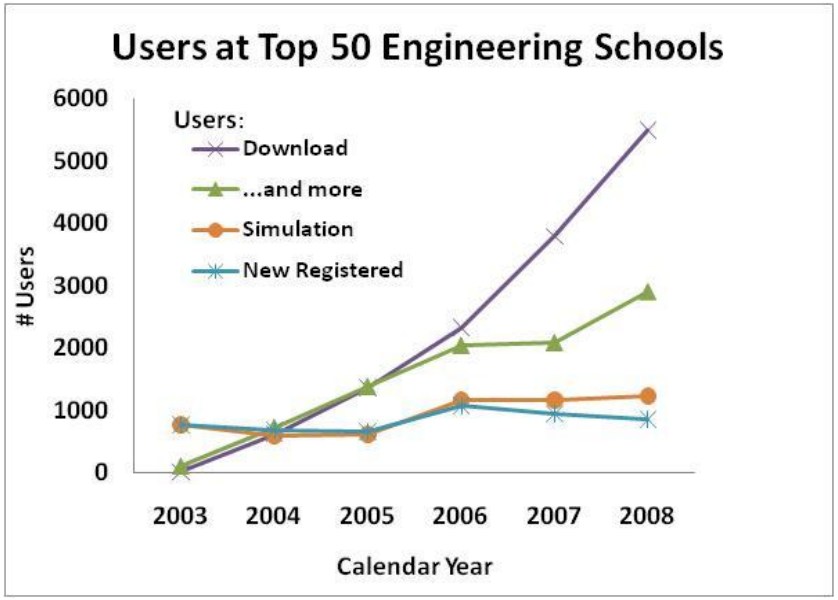
Simulation tools:

- Demonstrations in class
- Homework assignments
- Class projects

Educational Use Is Growing

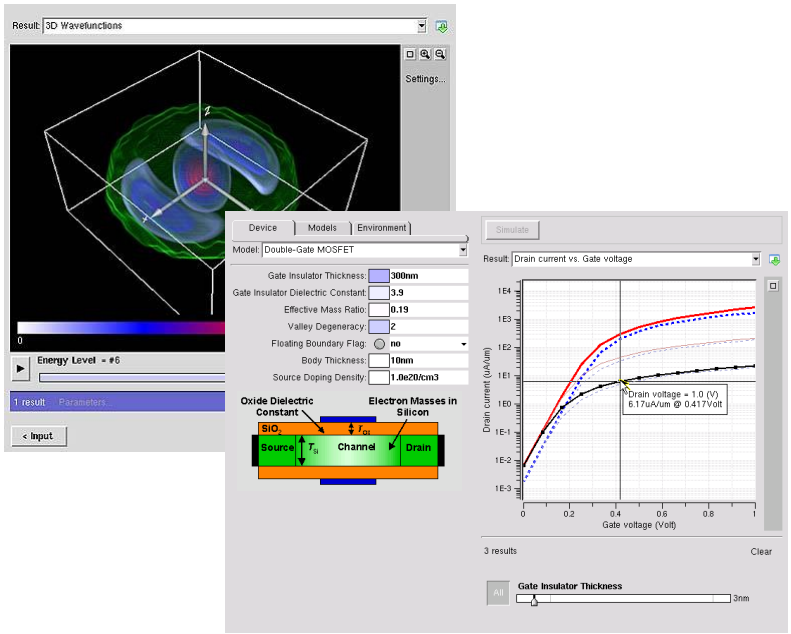
116 classes
at 97 institutions
in 2009

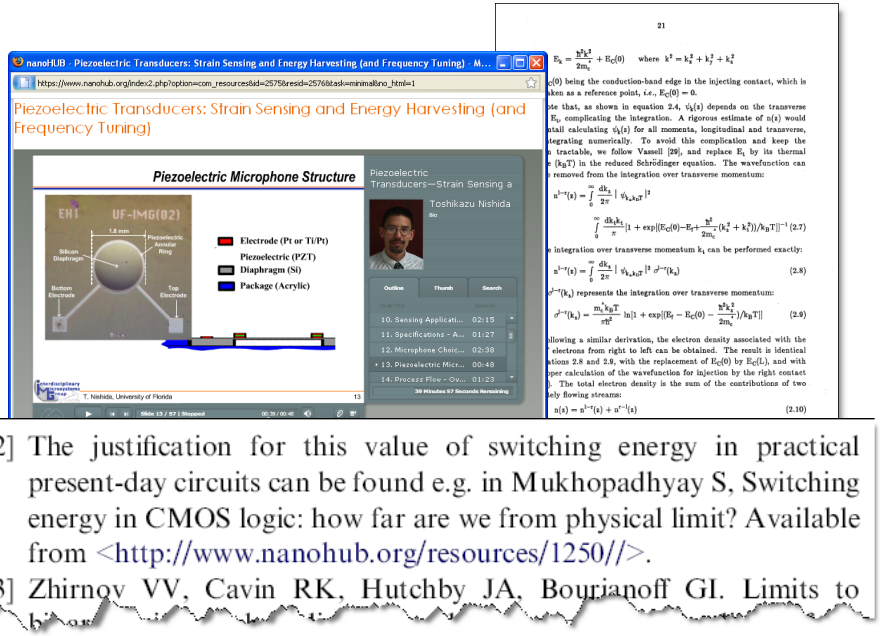




nanoHUB.org Educational Usage

Supporting Research





[2] The justification for this value of switching energy in practical present-day circuits can be found e.g. in Mukhopadhyay S, Switching energy in CMOS logic: how far are we from physical limit? Available from <http://www.nanohub.org/resources/1250//>.

[3] Zhirnov VV, Cavin RK, Hutchby JA, Bourianoff GI. Limits to

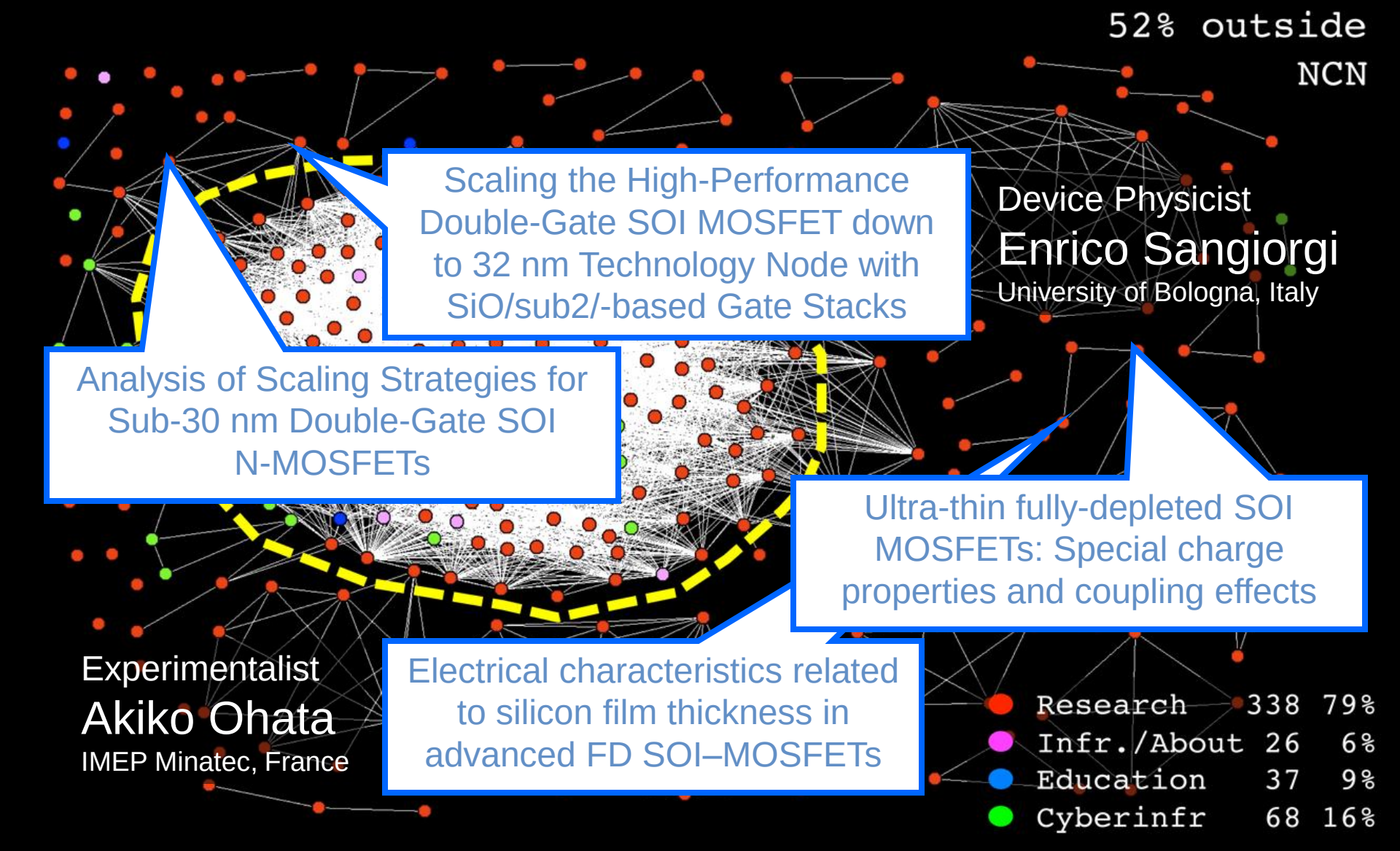
Simulation tools:

- Used by theorists
- Used by experimentalists

Tutorials and Seminars:

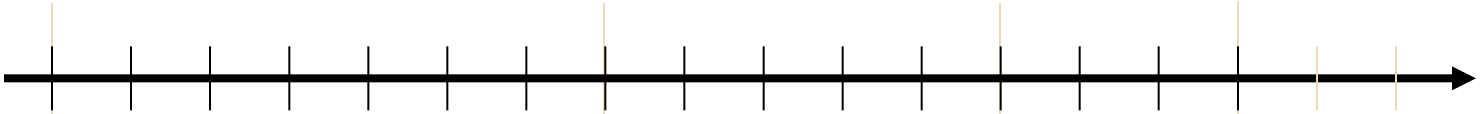
- Cutting edge research
- Cited in journal articles
- Preprints and tech pubs

More than 500 citations to resources



Leveraging the Platform

~ $15.5 million of development
NSF Network for Computational Nanotechnology



1995

Mark Lundstrom
Purdue University

2002

nanoHUB
online simulation and more

2009

HUB

open source

PHARMAHUB

thermalHUB

cceHUB
cancercareengineering

…others

Hubs ‘Я Us

hubzero.org
HUB

- Feb 2007: 1 hub
- Feb 2008: 5 hubs
- Feb 2009: 8 hubs
- Feb 2010: 21 hubs

Each hub has its own funding stream

new

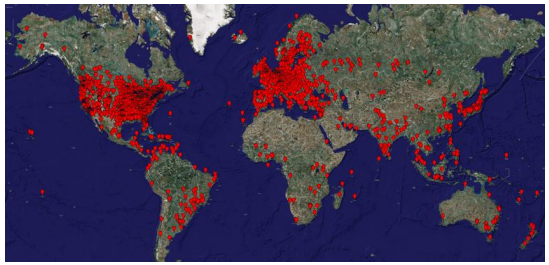
HUBzero: an organization with Recharge Center

HUBzero Consortium

- Four founding members
- Ongoing development of HUBzero core
- Documentation: http://hubzero.org/documentation
- Dissemination and support, yearly conference

Cyberinfrastructure is changing…

Sharing of information

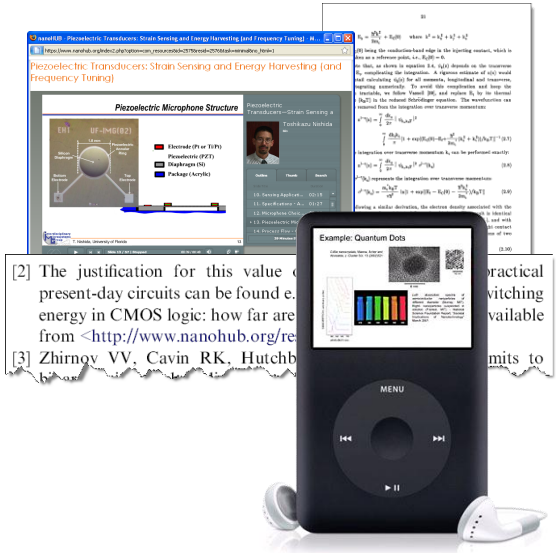


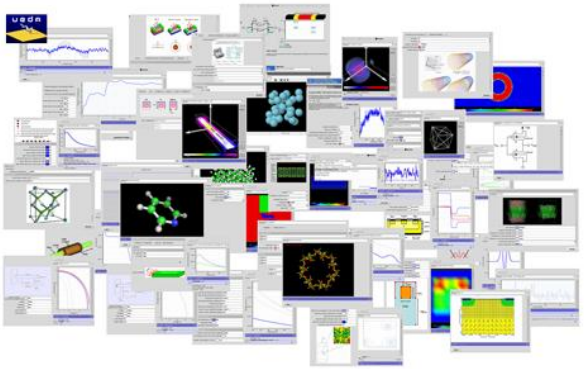
HUB

PURDUE UNIVERSITY

http://hubzero.org

Practice of science





Pace of model development