

Technology Use in Graduate Education

Diana G. Oblinger, Ph.D.



The start of something bigger....

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Main Page


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Today's featured article

 **Benjamin Mountfort** was an [English](#) emigrant to [New Zealand](#), where he became one of that country's most prominent [19th century architects](#). He was instrumental in shaping the city of [Christchurch](#). He was appointed the first official Provincial Architect of the developing province of [Canterbury](#). Heavily influenced by the [Anglo-Catholic](#) philosophy behind early Victorian architecture he is credited with importing the [Gothic revival](#) style to New Zealand. His Gothic designs constructed in both wood and stone in the province are considered to be unique to New Zealand. Today he is

In the news

- In response to [allegations of **Our'an desecration**](#) at [Guantanamo Bay](#), [Cuba](#), [The Pentagon](#) confirms that several such instances, accidental and intentional, have occurred.
- In [tennis](#), [Justine Henin-Hardenne](#) beats [Mary Pierce](#) 6-1, 6-1 to win the [women's single title](#) in the [2005 French Open](#).
- A video from the [1995 Srebrenica massacre](#) showing



WIKIPEDIA
The Free Encyclopedia

- Main Page
- Community portal
- Current events
- Recent changes
- Random page
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- Donations

search

Go Search

toolbox

- What links here
- Related changes
- Special pages

Collective intelligence

- Collective intelligence: everyone has something to contribute
- Knowledge is created not possessed
- Shift in emphasis, e.g., wikipedia is a process not a product
- Social connections are important
- Need “skills for participation” (e.g., social skills; cultural competencies) not just individual skills
- Age doesn’t matter; a “newbie” can be 60 and the expert 16



—Jenkins, 2008

It is more than technology

- The Internet is more than a technology—it is a mindset
- Internet provides an architecture for participation and collaborative creation
- Use by everyone does not exclude use by anyone
- Traditional assumptions are being re-examined
- Our students are harbingers of change



**What do you want to
achieve?**

Collaborative

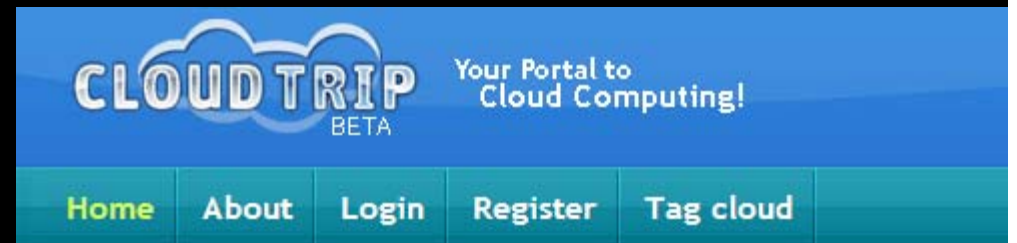
Daily collaboration tools

- IM
- Skype
- Wikis
- Google docs
- Web conferencing



Access without ownership

- Internet (“cloud”) use of applications, resources
- Streamlines operations
- Share across many organizations



Recently Popular | [Top Today](#) | [Yesterday](#) | [Week](#) | [Month](#) | [Year](#) |

Communicate and connect

- Gmail**
Email with 7.290324 GB of storage per account, mail search tools and integrated instant messaging, voice chat, and video chat.
- Google Talk**
Free text and voice calling around the world.
- Google Calendar**
Coordinate meetings and other events with sharable calendars.

Collaborate and publish

- Start Page**
Access your inbox, calendar and group info, plus search from one place.
- Google Docs**
Create and share documents managing attachments.
- Google Sites**
One-stop sharing for team

2
Vote



[SurveyMonkey - Online surveys](#)
Create surveys that your audience takes online. Free up questions.

Posted by [overlord](#) [Communication](#)

| Tags: surveys

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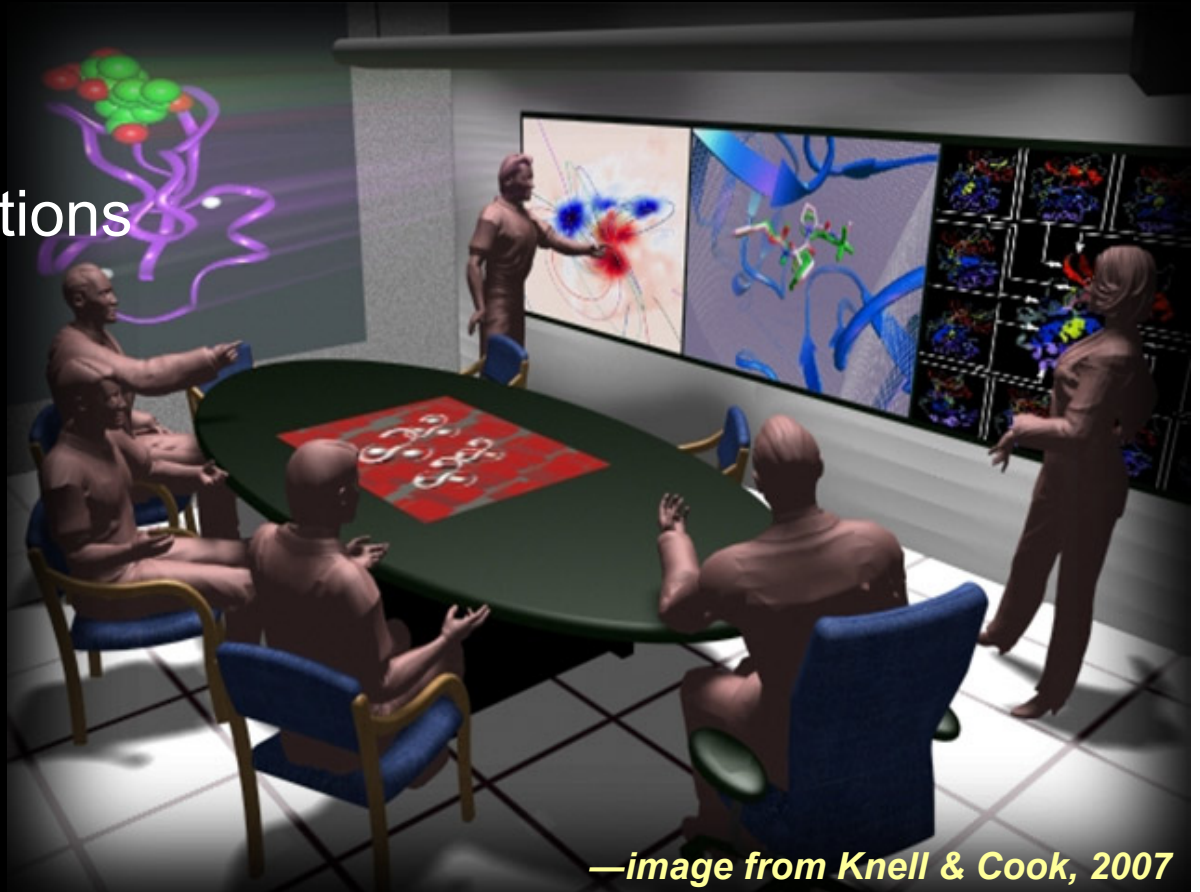


[Pacific Timesheet](#)

Web-based timesheet and time tracking software for Pay

Co-laboratories

- Distributed research centers
- Shared, community-wide data system
- Open system for community contributions
- Speeds discovery, innovation



—image from Knell & Cook, 2007

Science gateways

- nanoHUB
- Science gateway for nanotechnology
- Learning modules: lectures, podcasts
- Industry-level tools
- Community

Home my nanoHUB Resources Contributors Events About Support

Thin Film Nanotubes
Simulate networks of carbon nanotubes

Explore random networks of carbon nanotubes with thousands of tubes and random orientations. Compute the conductivity of these networks and simulate their performance in transistors of various geometries.

Learn more

Simulate

- Nanoelectronics
Tools for nanoelectronics
- NEMS/Nanofluidics
Tools for NEMS and Nanofluidics
- Nano-bin

Research

- Seminars
Browse research seminars
- Collaborate
Work with your colleagues

Teach & Learn

- Nano 101 / Nano 501
Introductory tutorials
- Nanocurriculum
Curriculum on Nanoelectronics

Quantum Dot Lab

About this tool | FAQ | Demo

Result: 3D Wavefunctions

Energy Level = #1

NTbands 2.0

About this tool | FAQ | Demo

Structure: Carbon Nanotube

Simulation Method: Pz orbital

Result: Molecular structure: overall

Chirality (n,m)
n: 8
m: 9

Tight Binding Energy: 3eV

http://www.nanohub.org - NANO HUB.ORG - A Gentle Introduction to N

A Gentle Introduction to Nanotechnology

Electrochemically Etched Tungsten S
(Etched in the Hersam Lab at Northwester

Mag = 300 X Tip A1 | Mag = 1000 X Tip A1

These tips, invented at IBM in 1983, started

Interactive

Patient case history

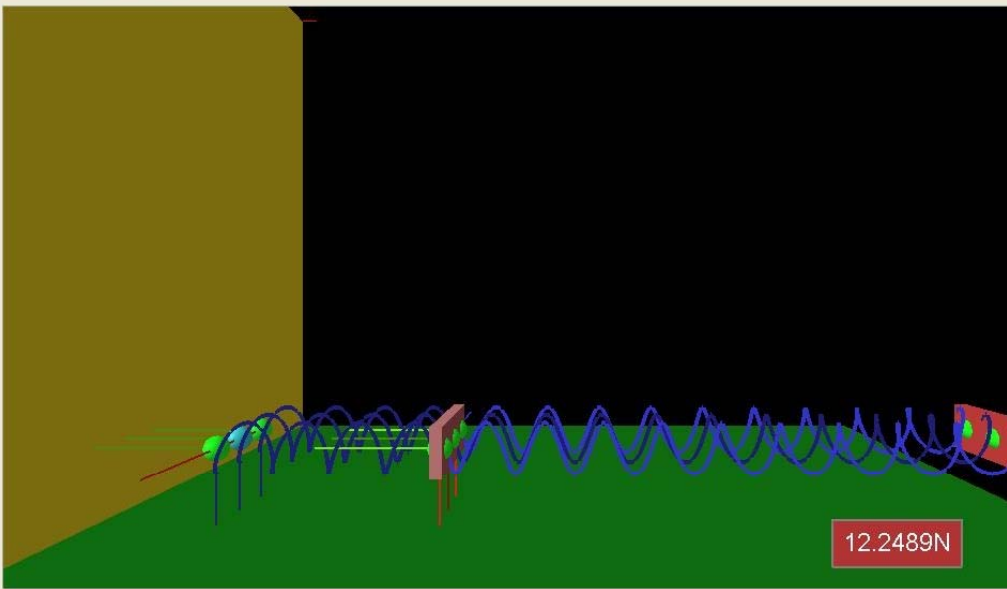
- Practice taking pharmacy patient case history in Second Life
- Prepares for working in remote clinics
- Patient avatar is interviewed by student
- Quiz follows interview
- Interview critiqued by faculty
- Accelerates learning



—Koval, 2009

Haptics

- Users feel force, pressure and temperature while interacting with virtual environment



The screenshot shows the SpringMassOscillator software interface. The main window displays a 3D simulation of a spring-mass system. A red mass is attached to a blue spring, which is connected to a fixed point. The mass is oscillating, and a red box in the bottom right corner displays the value 12.2489N. The control panel includes buttons for Load Mass, Disable haptics, Move Up, Move down, Add Parallel Spring, Remove Parallel Spring, Add Successive Spring, and Remove Successive Spring. It also features a Camera zoom slider and a Joystick Force Feedback section with fields for Joystick Name, X coordinate, Y coordinate, and Feedback Force (N). The Physics Spring Parameters section includes fields for Spring Force (N), Displacement (m), Spring Constant#1, Haptic Frequency, Damping Coefficient, and Spring Constant#2, along with checkboxes for Switch Restoring force feedback and Invert Force Amplitude Change. An Adjust Mass slider and a Number of Coils slider are also present.

SpringMassOscillator

12.2489N

Load Mass

Disable haptics

Move Up Move down

Add Parallel Spring

Remove Parallel Spring

Add Successive Spring

Remove Successive Spring

Camera zoom

Physics Spring Parameters:

Spring Force (N): 12.2489N Displacement (m): 12.2489mm Spring Constant#1: 0.3333N/mm

Haptic Frequency: 0.0000sec Damping Coefficient: -1.5 Spring Constant#2: 0.1333N/mm

Switch Restoring force feedback

Invert Force Amplitude Change

Joystick Force Feedback:

Joystick Name:

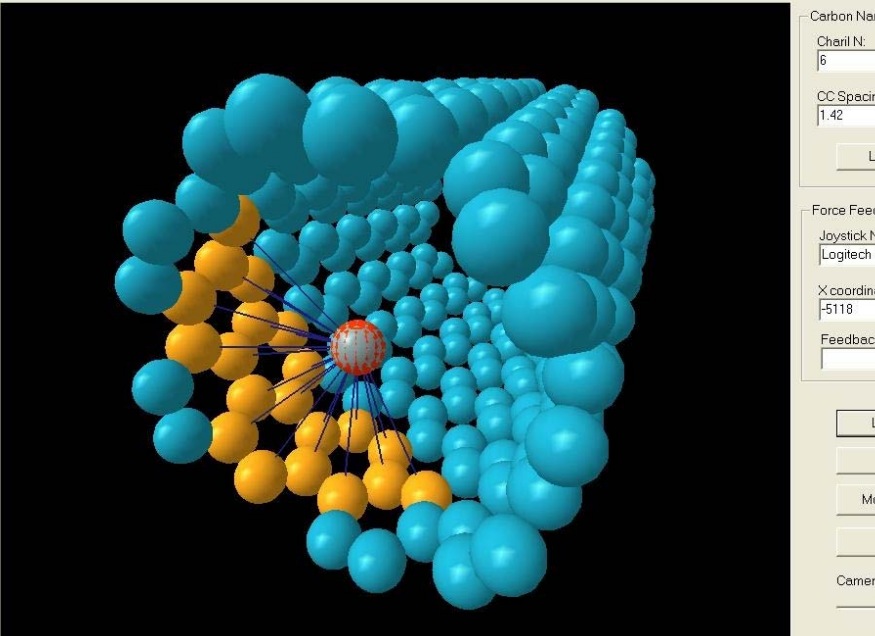
X coordinate: 0 Y coordinate: 0

Feedback Force (N):

Enable Joystick

Adjust Mass:

Number of Coils:



The screenshot shows the NanoTubeSimulation software interface. The main window displays a 3D model of a carbon nanotube, represented by a series of blue and yellow spheres. The control panel includes buttons for Load Carbon Nano Tube, Disable haptics, Move Up, Move down, and Enable Joystick. It also features a Camera zoom slider and a Joystick Force Feedback section with fields for Joystick Name, X coordinate, Y coordinate, and Feedback Force (N). The Joystick Name field is set to Logitech Force 3D Pro USB. The X coordinate is -5118 and the Y coordinate is -7110.

NanoTubeSimulation

Carbon Nano Tube

Charil N: 6

CC Specin: 1.42

Load Carbon Nano Tube

Disable haptics

Move Up Move down

Enable Joystick

Camera zoom

Force Feedback:

Joystick Name: Logitech Force 3D Pro USB

X coordinate: -5118 Y coordinate: -7110

Feedback Force (N):





00:00:00



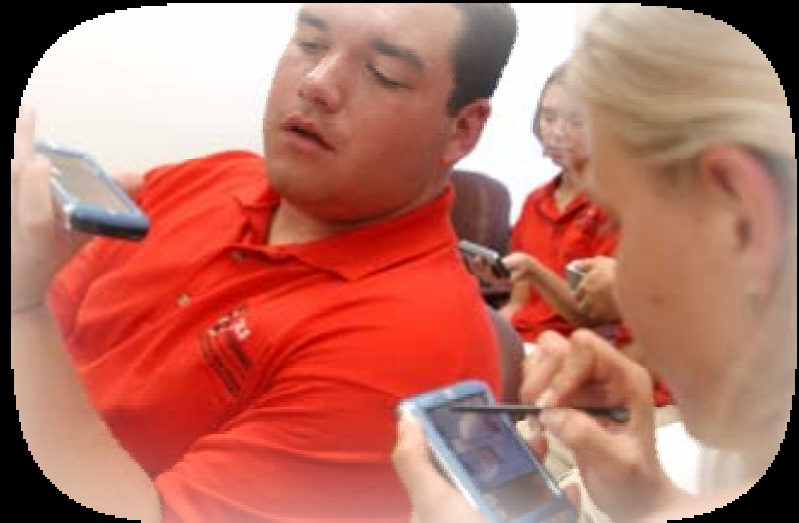
Firefighter_5

Carnegie Mellon, 2006

Discovery

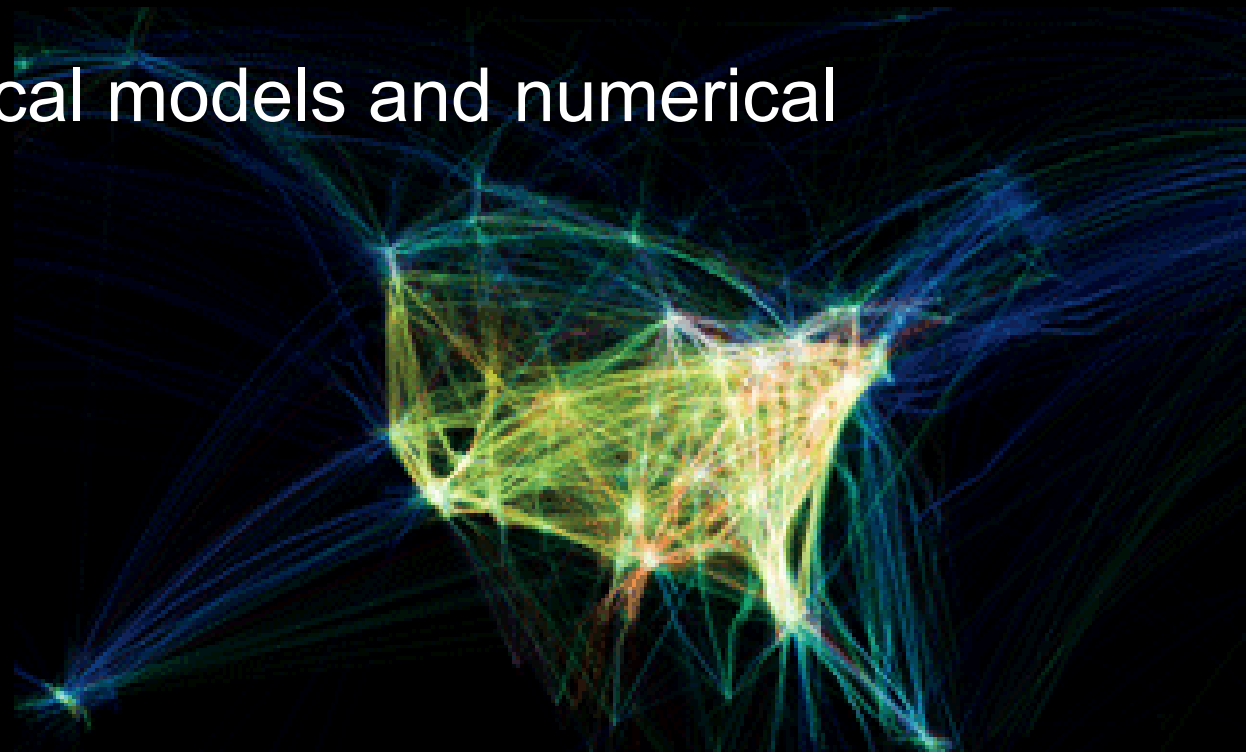
Data driven

- Large data sets; data extraction
- Data warehousing
- Statistical techniques
- Predictive modeling
- Analytics
- Uses:
 - Student recruitment
 - Student retention



Computational science

- Application of computer simulation (and other forms of computation) to scientific problems
- Third mode of science; adds new approach to theory and experimentation/observation
- Uses mathematical models and numerical methods



—image courtesy of NSF, 2009

Infrastructure for discovery



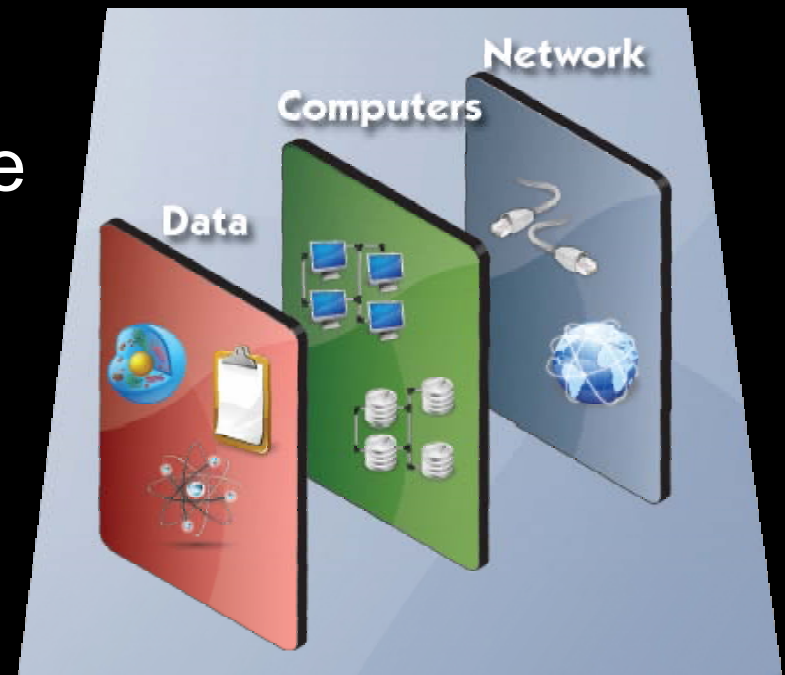
Sensor networks



—McCartney, 2008

Large datasets

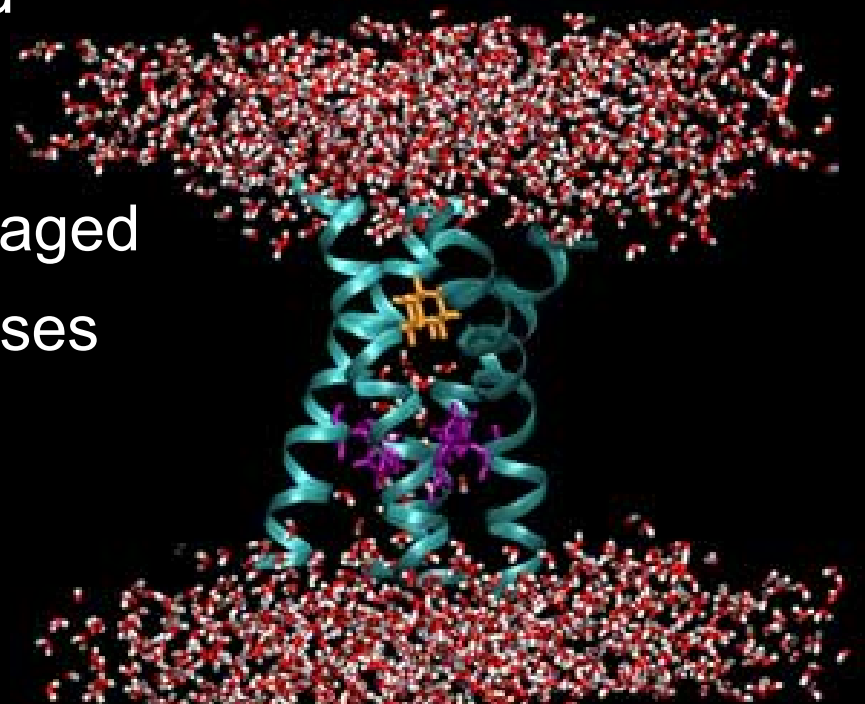
- The amount of data is doubling every year
- Large collaborations are emerging to collect and aggregate data
- E-research is emerging; computational techniques are essential
- Scientists need to be at home with their discipline, but also data management and computational skills



—Campolargo, 2008

Distributed resources

- TeraGrid: Open, distributed scientific discovery infrastructure—brings campus resources together in grid
- Low-threshold access to more resources than a campus could afford individually
- Distributed facility; resources independently owned and managed
- 100+ discipline-specific databases
- Enable communities to use resources through a common interface

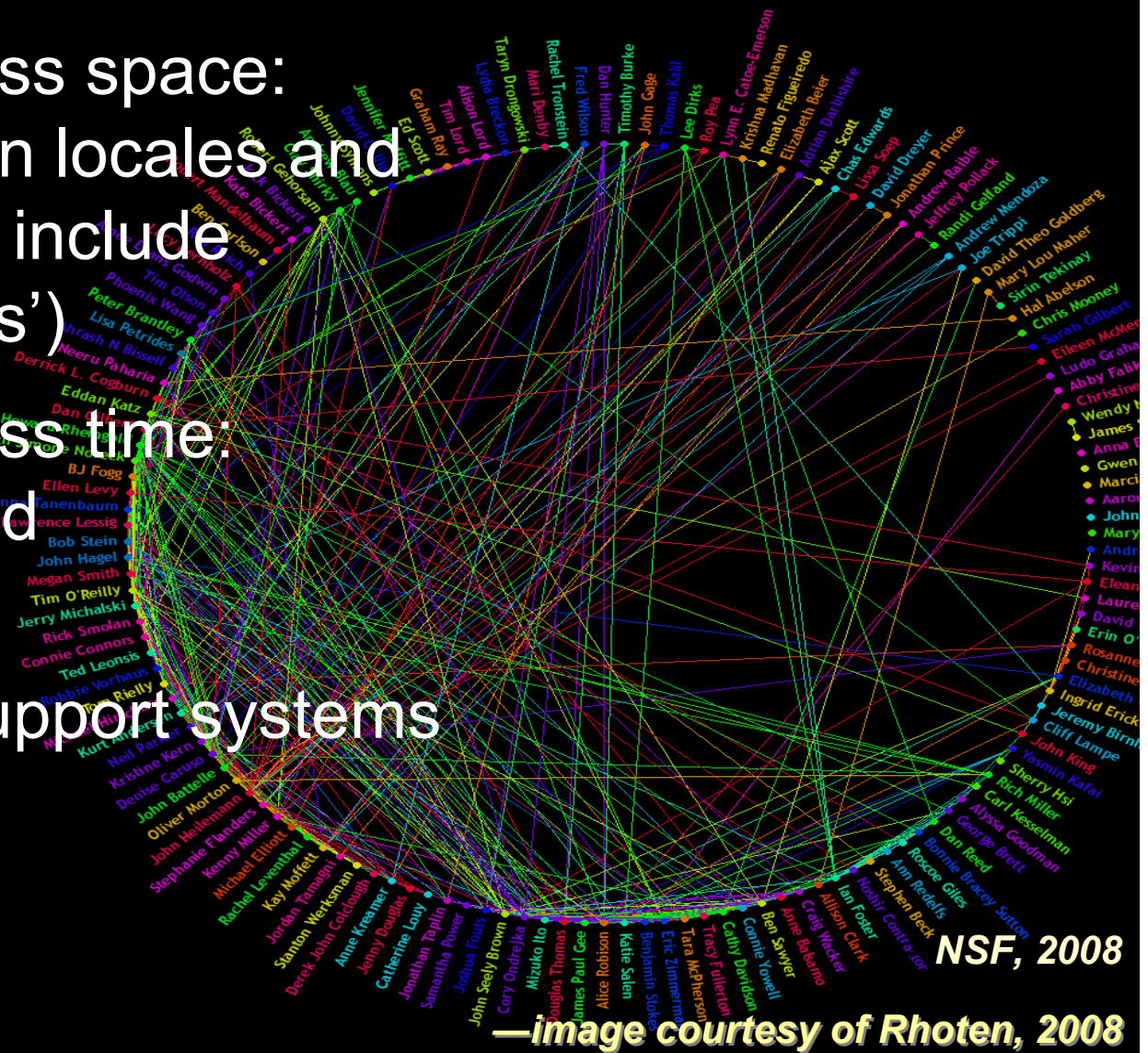


Visualization



Virtual organizations

- Distributed across space: participants span locales and institutions (can include 'citizen scientists')
- Distributed across time: synchronous and asynchronous
- Collaboration support systems



Self-Publishing

Open educational resources

- Open Courseware Initiative
- Connexions
 - Open access educational resource
 - Collections of re-usable learning modules
 - Modules can be modified
 - 350 collections; 6500 modules

The screenshot shows the Connexions website interface. At the top, the logo "CONNEXIONS" is displayed with a stylized orange 'X' icon. Below the logo is a navigation menu with buttons for "Home", "Content", "About Us", "Help", and "MyCNX". A breadcrumb trail indicates "You are here: Home".

The main content area is divided into several sections:

- Connexions is:** A descriptive paragraph stating it is a place to view and share educational material made of small knowledge chunks called modules. It lists three user roles: authors, instructors, and learners.
- More about us ...** and **New features** links.
- FEATURED CONTENT:** A section titled "Collaborative Statistics" with a book cover image and a short description of the book.
- FIND CONTENT:** A search bar with a "Go" button and a list of categories to browse by, including Arts, Business, Humanities, Mathematics and Statistics, Science and Technology, and Social Sciences.
- CREATE CONTENT:** A section with the text "Creating content in Connexions is as easy as 1, 2, 3:" followed by three numbered icons representing the steps: 1. User profile, 2. Content creation, 3. Sharing/Review.

Web-based publishing

- Omeka
- Digital dissertation
- Primary source collection
- Scholars, librarians, archivists, museum professionals



The Fall of Communism in Eastern Europe



Introductory Essay

Sets the scene for



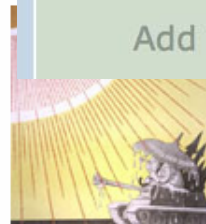
Primary Sources

300 primary



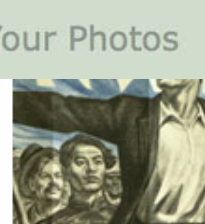
Scholar Interviews

Four historians



Teaching Modules

Six teaching



Case Studies

Teaching case

HDMB News: HDMB at New Media Conso

Collecting and Preserving the Stories of Katrina an

Home Add to the Memory Bank Browse Collections About FAQs

We welcome contributions from survivors, first responders, relief workers, family, friends, and anyone with reflections on the hurricanes and their aftermath.

Featured Image

Featured Story

"My family and I evacuated the Sunday before Katrina. intended on staying and riding out the storm, but when saw how much strength it had gained during the previ days of tracking it, we had no choice but to pack a cou of days' worth of clothes and food, and head out on a journey that we never would have expected." [More...](#)

Add Your Story

Add Your Photos

Self-publishing

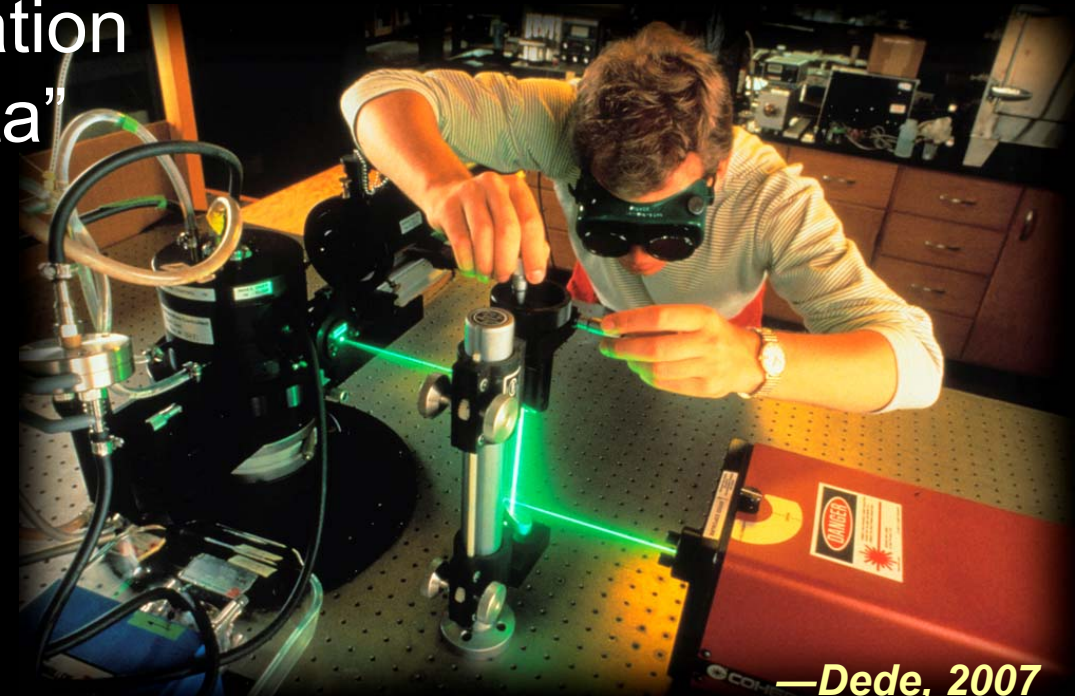
- Self-publishing marketplace
- Compliments publishing industry
 - Allows more voices to be heard
 - Serves small, non-profitable markets
 - Goal is to have a million authors who sell a few books rather than a few authors who sell a million books
- Web 2.0 site in the sense that the value to the web site is what users put there

The screenshot shows the Lulu.com website homepage. At the top, there is a search bar and navigation links for "Log In", "Sign Up", and "Sh". Below the search bar are tabs for "Publish", "Buy", "Sell", "Community", "My Lulu", and "Help", along with a "First time visitor" button. The main content area is divided into three columns: "Publish" (your words, your art. For fun or for profit.), "Sell" (your creations to buyers in more than 80 countries.), and "Connect" (to the largest online community). Below these columns is a section titled "Buy in the Global Marketplace" with a "Start shopping" button and a list of benefits: "Products from a million creators", "Join 500,000 others who visit each week", and "Books, artwork, CDs and all sorts of goodies". To the right of this section is a "Create your masterpiece" section with a megaphone icon and the text "Lulu's easy and effective program gets you the traffic".

Summary

Technology use in graduate education

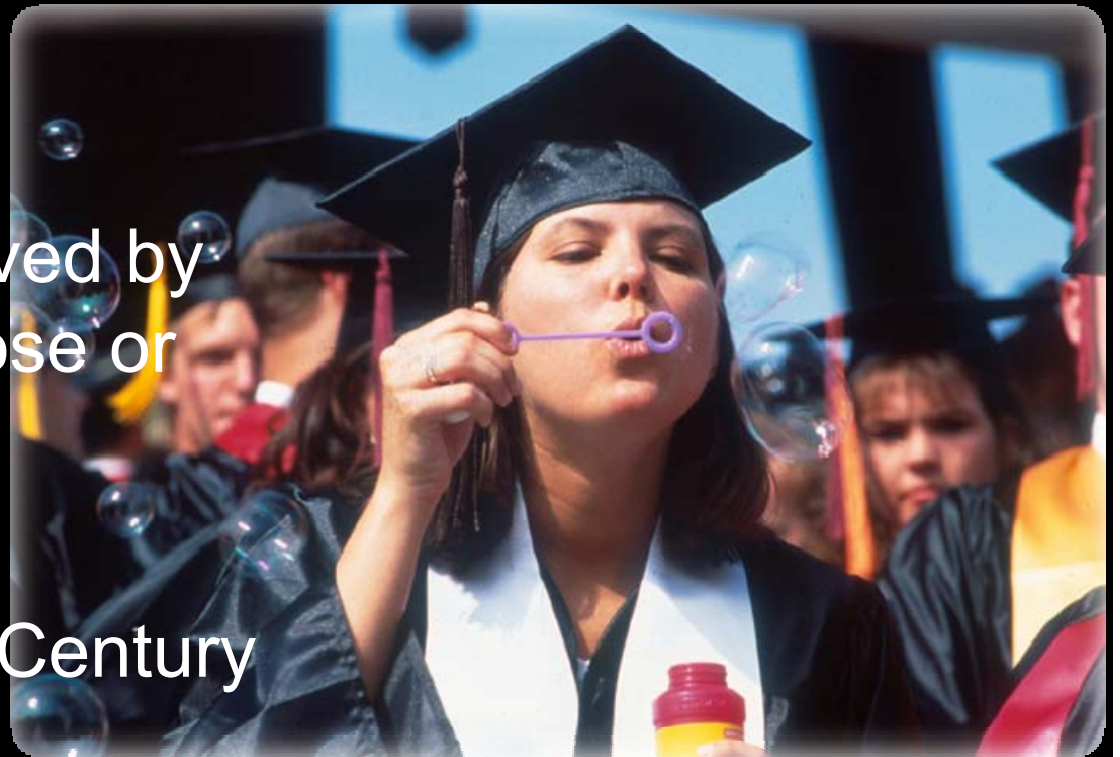
- Connects learners to experts and communities
- Learning in real-world contexts; complex problem solving
- Expanded access to resources
- Analysis and visualization tools to “think with data”
- Streamline delivery of content



—Dede, 2007

Big questions

- How does scholarship change when it is “born digital”?
- Do we have a collaborative culture and a reward structure that encourages collaboration?
- Is the institution’s reputation best served by holding material close or giving it away?
- How do we define education in a 21st Century context?



UNCOMMON
thinking for the
COMMON
good

It's not about information.

Or technology.

It's what we do with IT
that counts.

doblinger@educause.edu

E D U C A U S E