Looking Around, not just straight ahead, to ‘see’ a possible future of graduate school education.

Be Aware of Tunnel Vision!

Presentation at annual meeting of the Council of Graduate Schools - Dec 5th, 2009
Opportunities/Challenges – from at least one point of view

• in the Science
• meeting the cost of specialized seminars
• new forms of the public intellectual
• in the humanities—new literacies
• re-inventing the land grant university for 21st C.
• stepping back
National Academy of Engineering Grand Challenges

- Make solar energy economical
- Provide energy from fusion
- Develop carbon sequestration methods
- Manage the nitrogen cycle
- Provide access to clean water
- Restore and improve urban infrastructure
- Advance health informatics
- Engineer better medicines
- Reverse-engineer the brain
- Prevent nuclear terror
- Secure cyberspace
- Enhance virtual reality
- Advance personalized learning
- Engineer the tools of scientific discovery
Provide access to clean water
Restore and improve urban infrastructure
Advance health informatics

Each of these challenges requires a socio-technical, interdisciplinary approach.
Are we preparing our student of such?
Are IGERT’s enough?

Manage the nitrogen cycle
Advance personalized learning
Engineer the tools of scientific discovery
As Nobel laureate and U.S. Secretary of Energy Steven Chu has remarked, “We seek solutions. We don’t seek—dare I say this?—just scientific papers anymore”

Going to the root of the problem creates boundary objects around which deep cross disciplinary work can take place. (math, physics, computation, anthropology, psychology)

A key to our radical innovations at Xerox PARC
“Tomorrow’s discoveries will depend less on our capacity to manage the biggest accelerator, the largest research center, or the fastest computer, and more on our ability to create fluid, responsive networks of scientists and engineers.”

Diana Rhoten
NSF – cyber infrastructure office

The Dawn of Networked Science,
The Chronicle of Higher Education
Preparing for the data tsunami
data, data, every where
but can I makes sense of it all?

*Moore’s Law Cubed*

The size of data bases are now exloding,
way outpacing Moore’s law!

In 6 years: the size of databases have grown by
a factor of 1000
while capability of CPUs’s have only grown by
a factor of 10
Science Paradigms

- Thousand years ago: science was **empirical** describing natural phenomena
- Last few hundred years: the **theoretical** branch using models, generalizations
- Last few decades: a **computational** branch simulating complex phenomena
- Today: **data exploration** (eScience) unify theory, experiment, and simulation
  - Data captured by instruments or generated by simulator
  - Processed by software
  - Information/knowledge stored in computer
  - Scientist analyzes database/files using data management and statistics
Are we preparing our science students/faculty for this 4th paradigm of science? And likewise for our students in computer, information & library sciences. The challenges are immense. We need new ways of thinking and doing.

- Today: data exploration (eScience)
  unify theory, experiment, and simulation
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The Long Tail in Education

80% of the cost comes from servicing the ‘thin’ part long tail i.e.; extremely niche courses/seminars

Let’s look at the long thin part of the tail.
Advanced Italian Literature Seminar

New kind of learning/scholarship platform: a highly specialized open, scholar's portal

New forms of peer review – a view into a practice

Brown Univ.
The Long Tail in Education

Are we collaborating across institutions?

Do we use cyber infrastructure for distributed learning, inquiry and exploration -- expanding scope while saving costs by sharing resources and expertise?
Blogging

• might professors that blog be useful?
• might blogs count for something in tenure cases? (or even hurt??)
• might there be a use for grad student blogging?

What?? I thought blogging was just a narcissistic pastime?
Juan Cole – Scholar and Blogger
University of Michigan.

Informed Comment
Thoughts on the Middle East, History, and Religion
http://www.juancole.com

Technorati Authority: 645

Middle East, foreign affairs, religion, Islam and history are discussed by a professional historian.
Henry Rosovksy – former Dean of the Faculty of Arts and Sciences Harvard University.

(and daily blog reader)

“Shots in the Dark,” by Richard Bradley

“The Spine,” by Martin Peretz

“Insidehighered”...daily analysis in considerable depth.

“Saving Alma Mater” by James C. Garland, a former public university president. Focuses on the plight of public institutions.
For full course descriptions and general information, please visit the Interactive Media Division on the SCA website.

**Master of Fine Arts**
The M.F.A. in Interactive Media is a three-year intensive program stressing creativity of expression, experimentation and excellence in execution of the emerging field of interactive entertainment.

**Bachelor of Arts**
The B.A. in Interactive Entertainment combines a broad liberal arts background with a specialization in game design & development, interactive media and traditional media production skills.

**Minor**
The Minor in Video Game Design and Management integrates theoretical concepts and practical skills to prepare students for a career in interactive entertainment, specifically the video game industry.

**Research**
The Interactive Media Division focuses its research in the areas of games, immersive and mobile...
Networked Science

Networked Humanities

Transforming scholarship across the university
“Knowledge is no longer that which is contained in space, but that which passes through it, like a series of vectors, each having direction and duration yet without precise location or limit.

In the future, it seems, there will be no fixed canons of texts and no fixed epistemological boundaries between disciplines, only paths of inquiry, modes of integration, and moments of encounter.”
A emergent multi-disciplinary collaboratory
anthropology – sociology – history – law –
literature – communications – cinema –
computer science.
(Over 50 universities)
Technologies of Imagination

Transforming scholarship across the academy
What is the future of academic publishing?

How can emerging forms of electronic publication reach broader publics while creatively exploring new forms of scholarship, collaboration and interactivity?

Vectors is an international, electronic journal dedicated to expanding the potentials of academic publication via emergent and transitional media. Vectors seeks to support new modes of research, artistic creation and cultural investigation that analyze and redirect the role of technology in an information-driven society.

Vectors combines scholarship with technology academic work that are collaborative, extensible, and digital.
The Vector Space -- an "intellectual paint program" or alternative index that allows users to browse article metadata visually.
Public Secrets
By Sharon Daniel
Design by Erik Loyer

“I figure that somewhere along the line we all have been pushed away in our life...”

“I was in beauty pageants. I was a ballet dancer... and then I just made a mess of my life”
This <Vectors> digital format allowed me both to realize and to invent a mode of thinking that was deeply collaborative and which forged connections between ideas, objects, and images.

... I am continually trying to think (and propose thinking to my students) dialectically and dialogically about Images and theoretical texts; for a theorist-filmmaker like Sergei Eisenstein, this entailed forming new ideas out of the "collisions" that take place between images. *Vectors* allowed me to take this notion much further than one might do in a relatively linear moving-image media or in a written text, as I was able to converge and collide multiple writings, objects, images, voices, and ideas together, which would allow the reader/viewer/visitor to reveal those connections on the screen.
The Big Picture
New tools, new forms of scholarship, new learners & new learning communities

CI-enabled science & engineering research

CI-enabled humanities research

CI-enabled learning

CI-enabled global societal engagement

The Research University in the Digital Age

Preparing for the Revolution
Technologies of Imagination
Bridging the gulf between humanists/artists & technologists

Increasing role of importance of the Arts and Humanities for Innovation in 21st century – changing social practices in a highly connected world often has increased unexpected consequences

Anne Balsamo/David Goldberg HASTAC
Implications for Engineering in an Exponential World

• Changing Role of the Engineer in this Future
  – No Longer Primarily a narrow Technical Specialist

• Knowledge Broker
  – Key “Social Node”
  – Concepts and Conceptual Developer
  – Internal Bridge between Needs and Capabilities
  – Link to External Information and Expertise
  – Inter-Disciplinary Understanding Essential

Jeff Cooper SAIC
And perhaps the most important for the 21st Century

IQ

EQ
Social/emotional intelligence

CQ
Communication intelligence

Are we creating students that are learning to listen with humility and an open mind?
Thank You

Special thanks to
Richard Adler – IFTF
Dan Atkins – Umich
Christian Sarkar