

**Georgia
Tech**



College of
Computing

Center for Twenty-First Century Universities

C21U

An IPaT Center

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What is C21U?

- Georgia Tech's living laboratory for fundamental change in universities
- Our mission is to foster and accelerate the invention, validation, adoption, and deployment of disruptive ideas in higher education
- Experiment with institutional form
- Maintain a 100 Year Vision of change in higher education

We exist because experimentation in university form needs a living laboratory

- New modes of delivery need to be tested with real students
- New curriculum approaches need to be validated in the marketplace
- New platforms need applications and content
- Analytical tools need actual data
- We are a place where real experimentation can happen

Our Objective:

- Use the output of the laboratory to drive innovative, diverse, maybe competing, visions of higher education in the 21st Century.
- We will provides a way to experiment with and innovate in all aspects of higher education that can be affected by technological disruption.
- *Small teams of developers so that faculty can get their ideas prototyped*
- *A network of technology companies who are committed to creating partnerships on a global basis*
- *Facilitators who can clear away bureaucratic clutter to get ideas into immediate classroom use*
- *Support for faculty participation in national and international initiatives*
- *Access to commercialization expertise and capital to help turn innovative ideas into new companies*

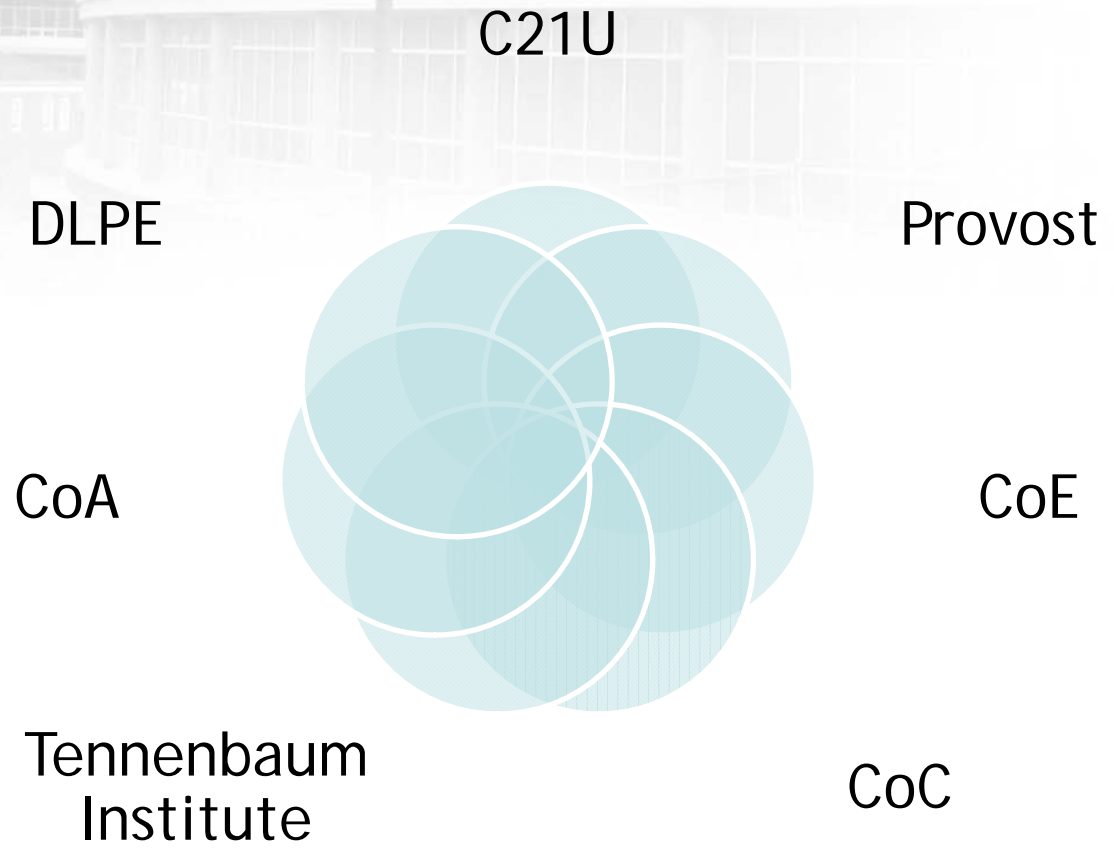


**Objective:
Innovation in
Higher Education**

- A laboratory for developing and testing technologies that transform learning experiences
- Platforms and methods that enable new modes of instruction
- Policy research aimed at identifying and experimenting with disruptive market forces
- Research and tools for increasing fiscal transparency

Many GT Stakeholders are Involved

- CEISMC
- CETL
- Auxiliary Services
- Finance



Primary Funding Sources and Activities

- Foundations
- Individuals
- Corporations
- Collaborations
- Faculty projects
- Student involvement
- Thought leadership
- *Strategic assignments*

Activities

- Advisory committees
- Knowledge Burst Student Competition
- Faculty Seed Grants
- Launch Event
 - Jonathan Cole will keynote
- *Proposed: Presidential Forum*
 - *High visibility speaker or panel*
 - *2 events*
 - *President moderates*



BACKGROUND

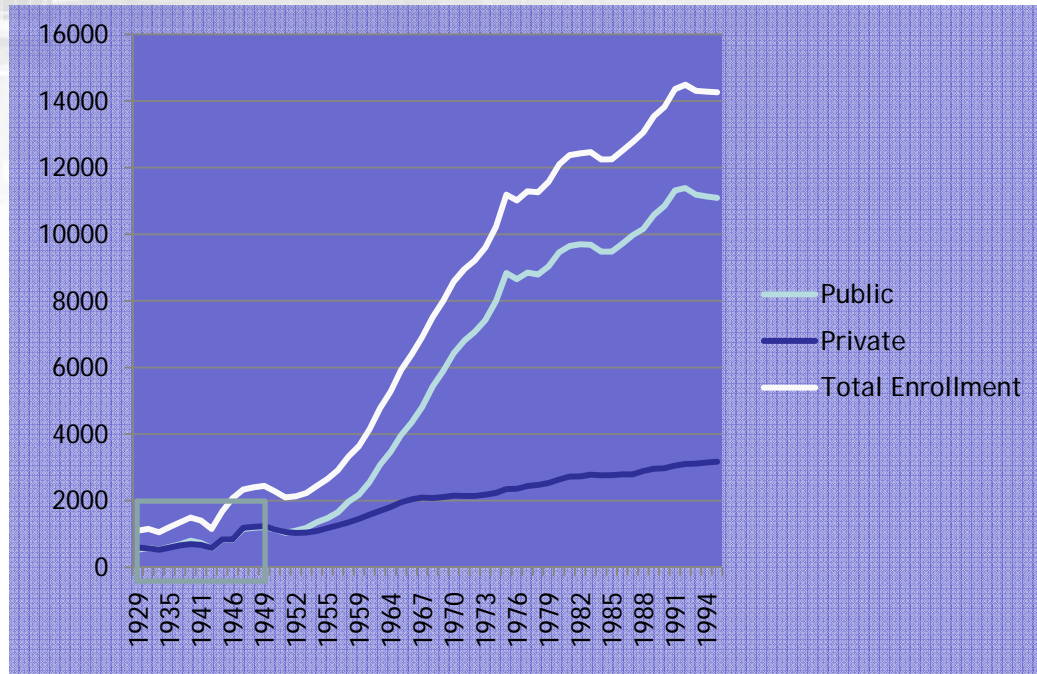
What does it mean to have a 100 year vision?

- A hundred years ago
 - Less than a half million students in US
 - Asia economically insignificant
 - No government funding of research
 - Land Grant movement still an experiment
- ...what will universities look like in a hundred years?

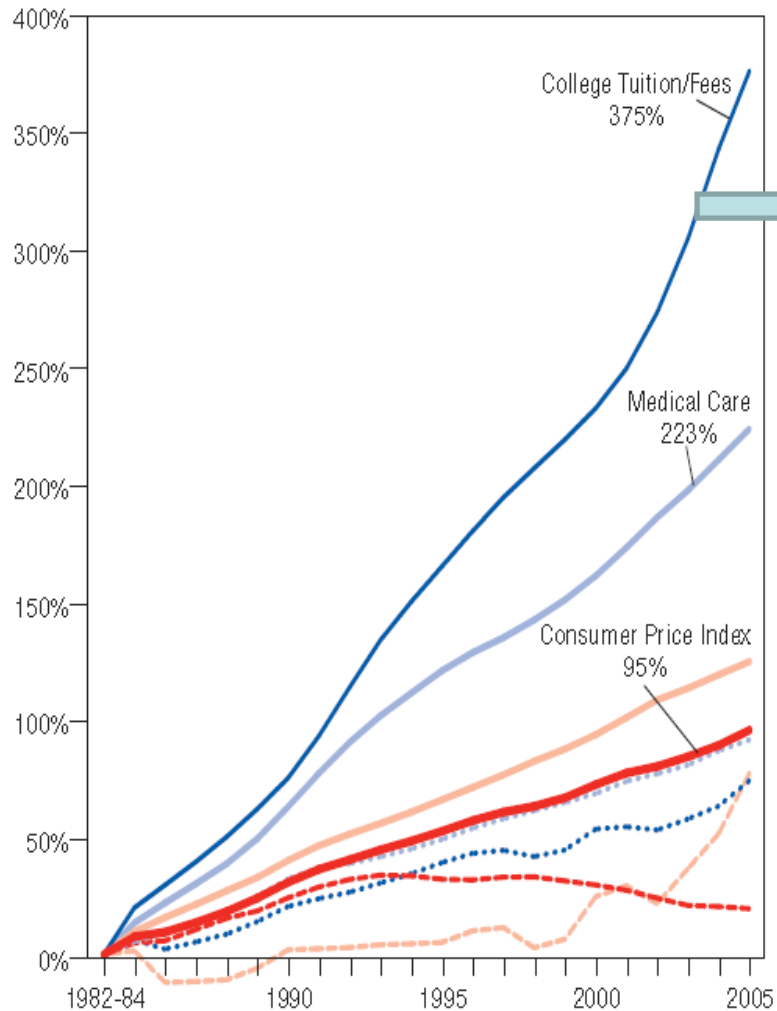
It's been a hundred years since the first rankings of universities: State universities were once small and wealthy

	1910	1925	2008
1	Harvard	Chicago	Harvard, Princeton
2	Princeton	Harvard	
3	Yale	Columbia	Yale University
4	Penn	Wisconsin	CalTech, MIT Stanford, Penn
5	Stanford	Yale	
6	Columbia	Princeton	
7	Cornell	Johns Hopkins	
8	Johns Hopkins	Michigan	Columbia, Chicago
9	Chicago	Berkeley	
10	Berkeley	Cornell	Duke
11	Michigan	Illinois	Dartmouth
12	Wisconsin	Penn	Northwestern Washington Univ
13	Illinois	Minnesota	
14	Minnesota	Stanford	Johns Hopkins
15	NA	Ohio State	Cornell
16	NA	Iowa	Brown
17	NA	Northwestern	Emory, Rice , Vanderbilt
18	NA	UNC	
19	NA	Indiana	
20	NA	NA	Notre Dame

The structure of (American) higher education was decided before we knew what it was going to do....



Cost of Higher Education 1980-2005: Fees have risen twice as fast as healthcare costs



None of this ends up in the classroom

Where are the New Experiments in higher education?

- The United States has not added capacity since 1960 (4x increase in students)
- Lots of past experiments
 - Dozens in medieval Europe
 - Peter Abelard (cir 1100)
 - Jesuits (cir 1600)
 - Hundreds in colonial America
 - University of Virginia (cir 1800)
 - Williams College (1820)
 - Thousands in post Civil War US
 - Harvard's disappearing requirements (1870)
 - US Land Grant Universities (1860)
 - Tens of thousands today
 - Open University, UK
 - Kahn Academy
 - India: 35,000 new colleges and universities

William Hewlett and David Packard

“INNOVATION NEEDS A LOT OF IDEAS”

Institutional Envy

- Less prestigious universities chase more prestigious ones
 - Private universities chase Harvard
 - Public universities chase Michigan
 - Technical universities chase MIT
- How do you get to be more prestigious?
 - How selective are you?
 - How much do you spend per student?
 - How predictable are your outcomes?

Some new models

- Threads
- Unbounded access
- Blogs and Social Networks
- MOOCs
- Tuitions based on services
- Hacking degrees
- Governments pay for successful results
- Intellectual commons
- *The New Wisconsin Idea*

Sample Projects

- Academic Equity Options: Market based value for academic credit
- Social networks for expanding the reach and effectiveness of student-faculty interactions
- Open blogging platforms for facilitating student interactions
- Massively open online courses (MOOCs) as alternative learning environments for certain disciplines
- Artificial intelligence, online social filtering, and search technology for augmenting human advising
- Predictability in the undergraduate curriculum: technology for helping students plan to graduate on time.
- Trend analyses for cost/value tradeoffs in selecting a college or university
- A dashboard for tracking the health of the research pipeline at American universities
- Evaluating commercial CRM models for enhancing the online course experience
- Quality clusters and self-accreditation
- Case studies of disruptive market forces and transformational change in higher education
- Comparative studies of curriculum change in the United States and Asia
- Tailoring Open CourseWare Repositories for accredited programs



Technology

“All that technology is used to make life easier for professors. Almost nothing has been done to help students handle the increasingly complex flow of information rushing at them.”

Gregory Abowd
(Inventor of Classroom 2000)

...the last great
classroom
invention



MOOC: What is it like to attend a seminar with 10,000 other students?



Paul Erdős: a 50 year wandering seminar

Gödel's Lost Letter and P=NP

a personal view of the theory of computation

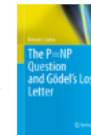
Home About Me About P=NP and SAT Conventional Wisdom and P=NP The Gödel Letter Cook's Paper Thank You Page

Fatal Flaws in Deolalikar's Proof?

AUGUST 12, 2010

by rjlipton

tags: finite model theory, flaws, Immerman, P=NP, Proof



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Possible fatal flaws in the finite model part of Deolalikar's proof

Neil Immerman is one of the world's experts on Finite Model Theory. He used insights from this area to co-discover the great **result** that NLOG is closed under complement.

Today I had planned not to discuss the proof, but I just received a note from Neil on Vinay Deolalikar "proof" that $P=NP$. Neil points out two flaws in the finite model part that sound extremely damaging to me. He has already shared them with Vinay, and suggested that I highlight them here. The comments from Neil are in the next section—I have only edited it slightly to make it "compile."

Two Flaws?

Dear Vinay Deolalikar,

Thank you very much for sharing your paper with me. I find your approach and your



MOST USED TAGS

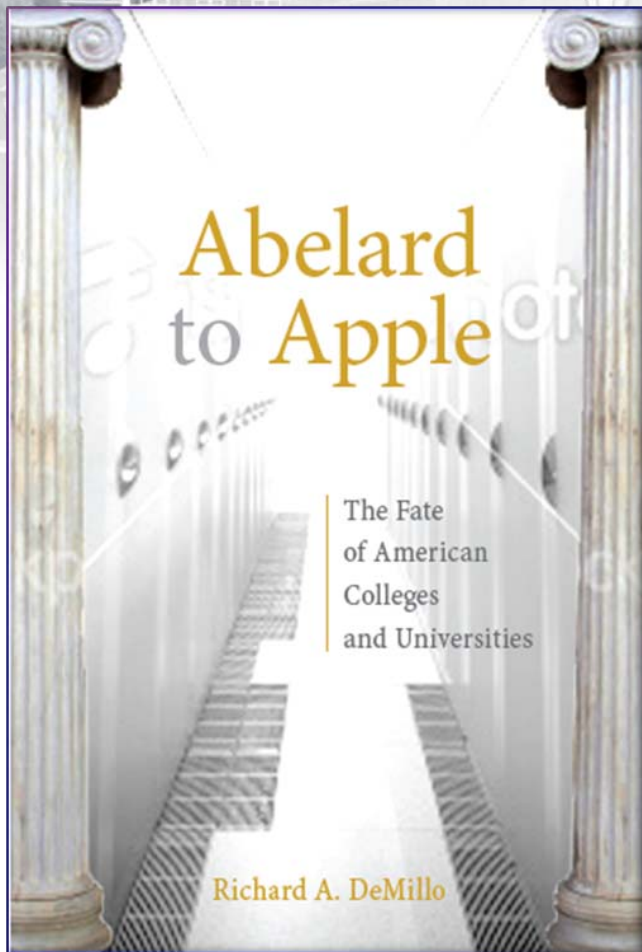
Algorithms approximation
award 200 boolean breaking crypto-
systems circuits complexity Cook
crypto-systems decision procedure
deterministic diagonalize Diophantine equations
Factoring Fermat formula graph Hilbert
Juss Karp language logspace lower
bounds Machine matrix
nondeterminism **P=NP**
polynomial **Problems** Proof

- 200 Posts
- 2 million views
- 100 sites link to it
- 12,000 visitors are not uncommon
- Top .1% of all Wordpress blogs

Who will be involved?

- Faculty from the
 - College of Engineering
 - College of Computing
 - College of Architecture
 - College of Management
- Collaborating Centers at GT
 - GVU (learning technologies)
 - Tennenbaum Institute (enterprise transformation)
 - GTISC (privacy, compliance)
 - C4G (access and affordability)
 - E2I
- Other strategic GT initiatives
 - X-College
 - Innovation Center
- Collaborating Centers at other Institutions

MIT Press 2011



- *How institutions of higher learning can rescue themselves from irrelevance and marginalization in the age of iTunes and YouTube*
- Clinging to a centuries-old model of higher education, most ignore the social, historical, and economic forces at work in today's world.
- The evolving model for higher education, from medieval European universities to American land grant colleges to Apple's iTunesU and MIT's OpenCourseware
- In the age of iTunes, open-source software, and online, for-profit universities, there are new rules for higher education.
- Ten rules to help colleges reinvent themselves

Who will
succeed over the
next 100 years?

Defining Value

Not based on
institutional envy

Focus on differentiation

Establish brand

Recognize weaknesses

Embrace openness

Architecting Form

Balance faculty-centrism
and student-centrism

Create the best
technology

Cut costs in half

Meaningful measures of
success

Societal success